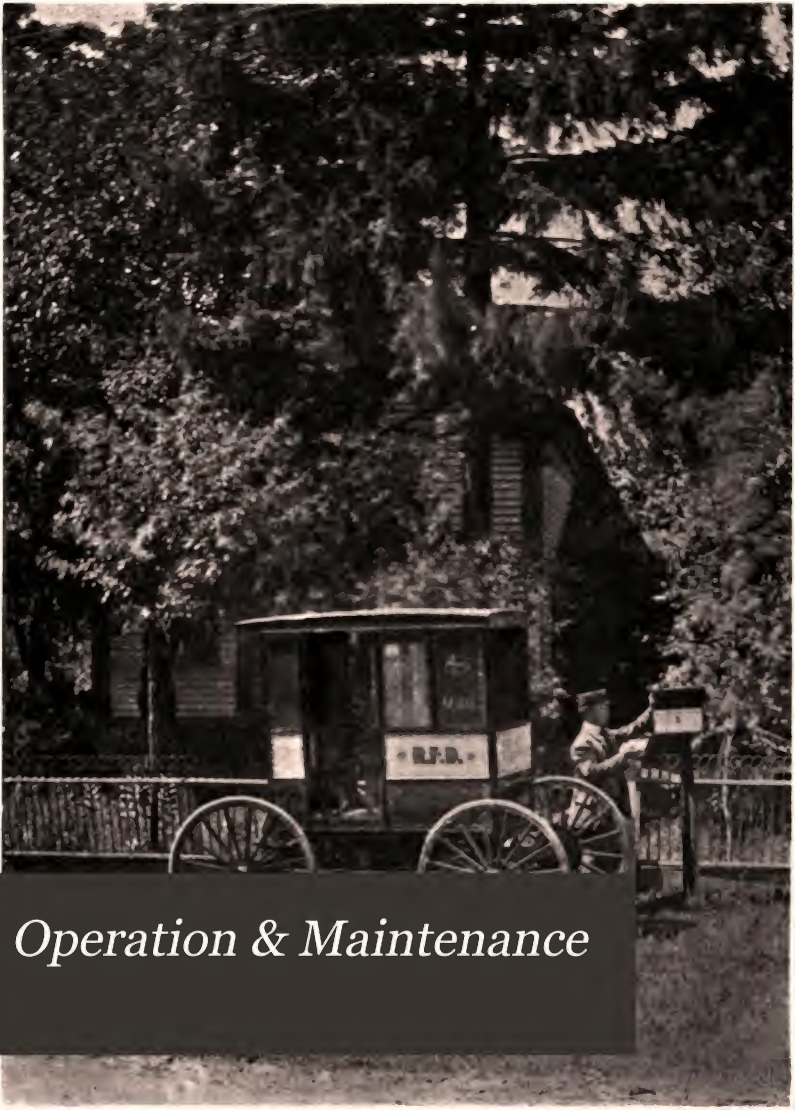

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CONTAINING INFORMATION ABOUT THE NATIONAL SHOWS

The COMMERCIAL VEHICLE

20 cents a copy JANUARY 1909 $2.00 a year

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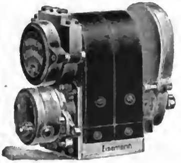
PUBLISHED MONTHLY BY

The Commercial Vehicle, Inc.

1402 Broadway, New York, N. Y.

EISEMANN MAGNETO



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The COMMERCIAL VEHICLE

Vol. IV January 1909 No. 1

Long after Millet

THE MAN WITH THE TRACTOR.

(With profuse apologies to Edwin Markham, author of "The Man with the Hoe")

Alert to centuries of the arts, he holds
A lever of the world and spurns the ground;
In coat and vest and collar and cravat,
Who rides more dignified down pike or lane?
Who struck him free of plow and balky team—
Of tugging lines about his bended neck—
Of shouts of "Gee!" "Git up!" and "Whoa!" and "Haw!"?

The times are changed! Alas, alack, for art!
No painter seeks him out for canvas pose;
No poet's muse will sing so up to date;
Humane societies are not for him.
All Sentiment, six furrows deep, is laid
Mile after mile behind, no more to rise
And sniff the odors of his gasoline!

Is THIS the Thing the Lord God made and gave
To wake the genius of some Bobby Burns?
If so, our poetry 'll be something fierce
After a few more of such centuries!

—HOLLIS W. FIELD

SHOW SEASON OPENS IN NEW YORK THIS MONTH

Elaborate Preparations Made at the Grand Central Palace and Madison Square Garden for the Instruction and Entertainment of the Visiting Public—Important Exhibits of Commercial Vehicles and Parts and Accessories

When these lines will have come under the eyes of our readers the great motor car show period will be in full swing in New York, and considering the widespread interest evidenced in every commercial center, and the elaborateness of the preparations, January, 1909, will certainly be unique in the history of American motor vehicle exhibitions.

The two shows will be held in succession at a short interval, as we previously announced. A keen competition between the two results from this fact, and it certainly will be difficult for the visitor to make up his mind as to which he prefers from the standpoint of elaborateness and of profuse display of all that can enhance the æsthetic value of the exhibits.

LISTS OF VEHICLE EXHIBITORS.

The members of the commercial vehicle industry taking part in the A. M. C. M. A. show which will be held in the Grand Central Palace, New York, December 31 to January 7, 1909, include the following:

American Motor Truck Co., Lockport, N. Y. (gasoline and electrics).
Reliance Motor Truck Co., Detroit and Owossa, Mich. (gasoline).
Rapid Motor Vehicle Co., Pontiac, Mich. (gasoline).
Pittsburg Motor Vehicle Co., Pittsburg, Pa. (electrics).
Lansden Co., Newark, N. J. (electrics).
Back Brothers, Allentown, Pa. (gasoline).
Gramm-Logan Motor Car Co., Bowling Green, Ohio (gasoline).
Hart-Kraft Motor Co., York, Pa. (gasoline).
Grabowsky Power Wagon Co., Detroit, Mich. (gasoline).
Bristol Engineering Corporation, Bristol, Conn. (taxicabs).
De Dion, Boston, Paris, France (gasoline).

The Abendroth & Root commercial vehicles from Newburgh, N. Y., which we gave as probable exhibits in our last issue have ultimately not been entered.

The exhibitors at the A. L. A. M. show to be held in Madison Square Garden, January 16 to 23, as as follows:

Alden Sampson Mfg. Co., Pittsfield, Mass. (gasoline).
H. H. Franklin Mfg. Co., Syracuse, N. Y. (gasoline).
General Vehicle Co., Long Island City, N. Y. (electrics).
Hewitt Motor Co., New York (gasoline).
Knox Automobile Co., Springfield, Mass. (gasoline).
Studebaker Automobile Co., South Bend, Ind. (electrics).
E. R. Thomas Motor Co., Buffalo, N. Y. (taxicabs).
Champion Wagon Co., Owego, New York (electrics).

The commercial vehicle exhibits are greater in number at the Grand Central Palace Show, but the standing of the majority of makers displaying their product at Madison Square makes the latter show quite as important in its way as the former.

GENERAL LAYOUT OF THE SHOWS.

Although utilitarian vehicles are not allowed to invade the main floor in either of the shows and are to some extent relegated to less prominent positions they are necessarily so from the structural limitations of the buildings. As some of our readers will possibly be interested in the general layout of the shows, independently of the section more directly pertaining to our trade, we will say that for both no expense has been spared to attract every possible visitor by supplying enjoyment for the eyes even of the most "blasé."

Both shows are run on well defined decorative plans, and for each a general style has been settled upon which will give them the individuality and the general uniformity of aspect found so beneficial in the past.

At the Grand Central Palace the visitor will be welcome through an attractive gate of the French "porte-cochere" style, with massive statuary of cariatides supporting brilliant electric signs. The vestibule of access to the main hall will be entirely draped with flags of all nations, the Palace sheltering the foreign importers as well as the national makers, and will be adorned with allegorical pieces of statuary and oil paintings.

The main hall will be decorated in an early English style, in imitation of country architecture, the balconies being partly hidden with red tiling over a frieze of scenes depicting the main automobile races and contests of the past year. The ceiling will be covered with sky blue fabric, and festoons of flowers and plants will give the gallery a hanging garden effect.

Allegorical figures in plaster of Paris will be scattered around the building, giving life to the general decoration scheme; white and gold will be the predominating colors in the latter.

An up-to-date restaurant and café will be installed on the third floor for the convenience of the inner-man and will be a reproduction of an old English country inn with its characteristic display of old chandeliers and pewter service.

DECORATIONS IN THE GARDEN.

At Madison Square Garden, although the scheme of decoration will be less striking and fanciful it nevertheless will be quite as elaborate and impressive.

The main decorative motive will be a triumphal arch which will stand at the Fourth Avenue eastern end of the hall. This arch will be supported by Corinthian columns, forming three large bays which will be occupied by equally large plate glass mirrors. The object of these mirrors is to double the view of the hall and to enhance the effect of the electric lights, lavished everywhere. Bronze lamps will be supported in front of this arch, bringing it out equally well at night as in the daytime. From this central piece of background will be supported or subordinated the entire layout of the main floor, making the whole a unique piece of ornamentation of perfect unity and substantial character.

Here, as in the Grand Central Palace, allegorical pieces of statuary and paintings will be appropriately disposed to bring out the important features of the decorative scheme.

In order to give visitors from the out-of-town trade an opportunity to draw full benefit from their trip to this city, the American Motor Car Manufacturers' Association has arranged a schedule of meetings to take place during the period occupied by the Grand Central Palace Show.

The dates have been organized as follows:

Thursday, December 31—3 p.m., private view of show, meeting executive committee New York Automobile Trade Association; 8 p.m., "Gala night"; 10 a.m., meeting Show Committee American Motor Car Manufacturers' Association.

Friday, January 1—Army and Navy night.

Saturday, January 2—Students' night; 10:30 p.m., show smoker to visiting motorists and dealers at A. C. A. club house.

Monday, January 4—2 p.m., executive committee meeting American Automobile Association; Engineers' night.

Tuesday, January 5—Executive committee meeting National Retail Automobile Dealers' Association; Society night; 4 p.m., meeting board of governors Automobile Club of America; 1 p.m., show luncheon to exhibitors by A. M. C. M. A., Hotel Manhattan; meeting Society of Automobile Engineers.

Wednesday, January 6—10 a.m., meeting of Committee of Management A. M. C. M. A.; 8 p.m., meeting board of directors Importers' Automobile Salon; Executive Committee meeting Motor and Accessory Manufacturers; Merchants' night.

Thursday, January 7—Executive Committee meeting American Motor League; Municipal night.

A. C. A. SMOKER FOR VISITORS.

The smoker which will take place on New Year's Eve at the Automobile Club of America at 10:30 P. M. will be opened to the show exhibitors and their guests, and they will be provided with cards of admission by the show committee.

No special arrangements have been worked out by the Association of Licensed Automobile Manufacturers for the visitors to the Garden show, the committee having preferred to leave its guests a free hand. Meetings will however be held principally of the American Motor League, of the Motorcyclists Union and of the various committees and groups with which the A. L. A. M. is connected.

The military night of the Palace Show should attract the special attention of commercial vehicle builders, as it will be a gathering of men keenly interested in the applications of motor traction in warfare. They are presumably well informed as to what motor trucks and wagons have done in the service of foreign armies and the opportunity will be exceptional for the American manufacturers to come in contact with them.

ARMY OFFICERS TO ATTEND.

Invitations have been accepted by distinguished officers of the army posts at Governor's Island, Fort Schuyler, Fort Wadsworth and Fort Hamilton who will attend the show in a body. Most of them have spontaneously expressed their interest, and amongst them will be noted Major General Leonard Wood, Major Amos W. Kimball, Major J. S. Mallory, Major W. G. Haan, and Majors Herman C. Schumm and W. H. Wilson.

On engineering night the attendance will include the engineers connected with the A. M. C. M. A., the A. L. A. M., the National Association of Automobile Manufacturers, the Engineer's club, the American Society of Mechanical Engineers and the Society of Automobile Engineers.

An indication of the trend of business conveyed by the missionary work done in the preparations for the shows, and the materialization of an opportunity for the makers of commercial vehicles will be the attendance expected from members of the carriage trade. Many tradesmen in this line of business have expressed their intention of joining the motor vehicle trade and will avail themselves of the shows to post themselves on the subject. There should be room for profitable connections to be concluded with them.

EXHIBITS OF PARTS AND ACCESSORIES.

Besides being the meeting place of a large attendance interested in complete vehicles, the shows will offer the trade and the buying public a unique opportunity to inform themselves on the development of the parts and accessories trades.

The parts makers will show a number of standard components such as frame fittings, change speed gearsets, axles, driving chains, springs, brake equipment and bearings.

The most notable advances will be found in the generalization of the use of forgings and pressed steel, in the employment of new friction materials in clutches and brakes and in the more widespread use of anti-friction bearings of the ball or roller types.

The tire makers will bring out a considerable variety of types evolved from the latest experience gained with heavy vehicles, and it will be noted that besides considerable improvements in fastening methods, the stability of the material itself has generally been improved by changes in the composition of the rubber compounds used.

Truck makers will be interested in noting special designs of gas motors for heavy vehicles, of which there has been a great scarcity in the market. The same will apply, although along a different line of construction to taxicab engines.

MAGNETO FOR MOTOR IGNITION.

Amongst engine fittings and accessories the most notable will probably be the latest models of magnetos, the use of which is becoming universal and due to a considerable extent to the simplification of construction which has taken place. The same applies to carbureters, of which there will be a large number shown.

The large mileage of trucks and cabs has made the lubrication question a vital one, and it will be interesting to note that a number of lubricants will be exhibited possessed of special suitability for commercial work.

In strictly the accessory line, the lamp makers exhibits will be of more than passing interest, as the lighting question is of more importance than at first sight is apparent in freight transportation, especially in the season of short days.

In a field also distinctly connected with vehicle construction and operation, will be shown a variety of garage equipment, such as gasoline storage tanks, oil fitters, bench tools, jacks, etc., all tending towards simpler and more efficient upkeep work.

To summarize, the two shows taking place this month in New York will be the most important and businesslike manifestations of the kind yet held in this country and no efforts should be spared by the interested parties both in the buying and the selling public to derive the full benefit of the efforts made by the organizers.

While the work vehicle exhibit is subordinate to the real purpose of the expositions, yet, as there is little likelihood of a separate truck show this year, the commercial exhibits in New York will attract especial attention.

CHICAGO SHOW IN FEBRUARY

With January gone by, and the show rush in New York quieted down, the West will come in for its share of strenuous motor car functions. On February 15 Chicago will fling open the gates of its great annual show.

The tremendous growth of motor vehicle sales in Western States has created an unprecedented demand for show space from makers both Eastern and Western.

The two large halls which in the past sheltered the motor car shows, namely the Coliseum and the First Regiment Armory, this year prove entirely inadequate. In order to cope with the number of applications from would-be exhibitors the show committee has found it necessary to open negotiations for the lease of a third building only one block from the Coliseum, in which to locate the overflow from the other halls.

This significant success of the Chicago exhibition is mostly due to the fact that it is being organized by the National Association of Automobile Manufacturers, which to a large extent combines the interests of the two bodies controlling the separate shows in New York.

It is regretable that the space congestion at the Armory and the Coliseum, together with the original purpose of the exhibition as a pleasure car show, has kept some of the most important commercial motor vehicle makers out of the present list of exhibitors. However, the addition to the available floor space, which is probable, should permit of a more representative display of commercial vehicles, and an exhibition commensurate with the magnitude of the industry is to be expected.

The list of truck and motor wagon makers whose participation is at present assured includes:

Rapid Motor Vehicle Co., Pontiac, Mich., (gasoline) with space on the main floor of Armory.

Grabowsky Power Wagon Co., Detroit, Mich. (gasoline).

Randolph Motor Car Co., Chicago, Ill. (gasoline).

E. R. Thomas Motor Co., Buffalo, N. Y. (taxicabs).

The three latter will occupy space in the basement of the Coliseum.

The organization of this show is in the hands of Mr. S. A. Miles, the general manager of the National Association of Automobile Manufacturers, with offices at 7 East Forty-second Street, New York, who will be glad to give any information desired by intending exhibitors.

DUAL MEETING OF ENGINEERS

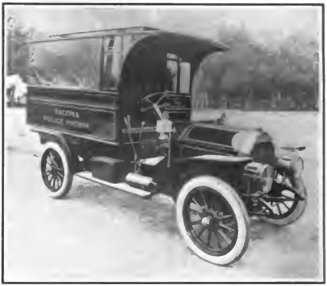
On the occasion of the show period in New York the Society of Automobile Engineers will hold two sessions —January 5 and 19.

On January 5 the members will meet at the Automobile Club of America on Fifty-fourth street, between Broadway and Eighth avenue, at 10 a. m., and witness interesting efficiency tests of various cars on the club's elaborate dynamometer. In the afternoon papers will be discussed on the "Economics of Weight Reduction," by F. D. Howe; the "Factor of Reliability in Ignition Apparatus," by A. Atwater Kent; "Requirements of Automobile Brake Construction," by Lawrence Whitcombe and Thomas J. Fay. The meeting will be followed by a dinner at the Automobile Club restaurant.

On January 19 a similar dynamometer demonstration will be given under the same conditions and in the afternoon the members will meet at the Engineering Societies' Building, 29 West Thirty-ninth Street, for the discussion of papers on an "Improved Type of Compression Coupling," by W. S. Noyes; "Standardizing Automobile Motor Bearings," by S. P. Wetherill, Jr., and "Some Practical Considerations in Autogenous Welding," by Henry Cave. If additional papers are submitted the order of discussion might possibly be altered. The dinner following this session will be held at the Engineer's Club on Fortieth Street, directly back of the Engineering Societies' Building. The members whose intention it is to be present at these sessions are requested to notify Mr. Charles B. Hayward, Secretary of the Society, at 231 West Thirty-ninth street, New York City.

TACOMA GAS MOTOR PATROL

A police patrol wagon, for which an operating cost of one-third that of horses is claimed, has been put in service in Tacoma, Wash. This machine, here illustrated, also brought about a considerable increase in the efficiency of the police service. The chassis is that of a 45-horsepower Stoddard Dayton, 1909 touring car, fitted with a closed box body built by the West Coast Wagon Company of Tacoma.



TACOMA GAS MOTOR POLICE PATROL WAGON

The body is a combination ambulance and police patrol, two seats upholstered in black leather run lengthwise of the body and will accommodate ten people handily. A stretcher closely strapped to the roof of the car is instantly available to form a couch in case of emergency in ambulance service. A small medicine chest and special water tank are provided just back of the driver's seat as first aid to the injured. A small electric storage battery is used for lighting purposes. Rubber curtains are provided to protect the occupant against inclement weather.

The gasoline cost approximates $10 per month at 16 1-2 cents per gallon. The patrol makes from 15 to 20 extended trips daily, covering the entire city of Tacoma.

THE NEED OF quicker transportation in Norway is the cause of the organization of motor 'bus companies to carry passengers and freight. General road improvement is planned as a result.

PACKARD TRUCK IN SERVICE OF SIMMONS HARDWARE COMPANY IN ST. LOUIS

COMMERCIAL VEHICLE SITUATION IN ST. LOUIS

Introduction of Motor Vehicles in the Service of Hardware, Dry Goods, and Publishing Houses--Large Equipment of Anheuser-Busch Brewery—Failure of Builders to Push Sale of Machines

E. PERCY NOEL

THE fact that commercial vehicles are being extensively used by several business houses in St. Louis—concerns that stand for the new St. Louis—is a splendid argument in favor of the power-driven vehicle for commercial purposes. To appreciate fully the significance of the use of these commercial cars, it must be known that the conditions in the Missouri metropolis are opposed in several different ways to the prevalent employment of delivery wagons and trucks propelled by motors.

In the first place, St. Louis is very much like an overgrown country town in some respects. Conservatism is carried to an exaggerated degree. As a city, it is markedly ignorant of advancements toward superior methods that have become common elsewhere. The streets within the city and all but one or two main thoroughfares in the suburbs are notoriously bad. Asphalt, where it exists, is not kept in repair to any noticeable degree. There are scores of unpaved side streets inside the city limits. In the thickly populated suburbs the majority of the streets are well-nigh impassable with any kind of a vehicle nine months out of the year.

On the other hand, the shipping facilities of all manufacturers and wholesale houses are unusually good. The city is encircled by railroad tracks and sidings make it possible for the majority of shippers to load their goods directly on the freight cars. This facility removes, to a certain degree, the usually valuable expedition of the motor truck although several shippers have learned of its utility in transferring freight from their own sidings to some other depot.

NO TRUCK AGENTS IN ST. LOUIS

There are no dealers in, or agents for, commercial cars in St. Louis who are pushing the sale of commercial machines. Whether it is that they have tried unsuccessfully to place vehicles with St. Louis houses, or whether there is no one with the necessary tenacity of purpose to do business, the fact remains that the field is practically unworked at the present time. Yet two of the largest concerns of their kind in the world and a department store that has been progressive enough to introduce on Olive Street the atmosphere of a Fifth Avenue establishment, are using motor driven vehicles and, from present indications, intend to do away with more horses and to add automobiles as the months go by.

One of these, the Simmons Hardware Company—recognized as probably the largest wholesale hardware house in the world—has in the past three years increased its motor equipment from one 5-ton truck to seven heavy haulers. The Anheuser-Busch Brewing Association has successfully operated from forty to fifty motor wagons for the past four years. The present equipment numbers more than fifty machines of which twenty are of 5-ton capacity. The Lewis Publishing Company has never used horses. For the past two years it has transported millions of copies of its publications to the trains by the use of commercial vehicles. Seven machines are in constant service for this company. Scruggs, Vandervoort and Barney, probably the best managed department store west of the Mississippi, has eleven machines in its delivery equipment.

Of course there are many other users of the modern means of delivery and hauling, but these concerns are representative of what may generally take place in St. Louis before many years pass. As business houses they stand for the highest development that St. Louis has yet attained commercially. The other users are working on a small scale, many just experimenting with one machine. Few of them have a garage or competent mechanic of their own for the care of their vehicles, but depend upon the not always considerate treatment of the public garage keeper.

AN EXPERIMENT THAT FAILED

The use of commercial vehicles by trades people and others requiring quick delivery received a severe blow by the false experiment of the St. Louis *Post-Dispatch*, made a year or so ago. This newspaper, with a great deal of publicity, purchased a large number of gasoline cars at a low figure. The machines were immediately turned over to inexperienced drivers—men taken from the horse-drawn wagons who, although they had practically no knowledge of the gasoline automobile were supposed to care for and keep their machines in running order. Any one who knows anything about machinery can imagine the result. First the machines showed signs of falling to pieces from careless handling over rough streets and afterward the motors frequently failed to do their work. Eventually the St. Louis *Post-Dispatch* had its full quota of machines for sale at a very low price.

FLEET OF MOTOR TRUCKS OPERATED BY THE LEWIS PUBLISHING COMPANY IN ST. LOUIS.

In August, 1906, the Simmons Hardware Company had just begun to realize the superior advantages of the 5-ton Synnestvedt electric truck which had been purchased a short time before. After adequate experimentation the company found the service of this vehicle more than satisfactory in every particular. Consequently the motor equipment was gradually increased until now there are seven machines in daily service.

The most recent addition was a 3-ton Packard gasoline truck. Carrying its full load, this car seldom does less than 35 miles a day and often accomplishes 40 miles. Because of the character of its motive power, the Packard is given the long hauls, which include frequent runs to a suburb 10 or 12 miles out of the city. The electric machines, which comprise one 5-ton Couple-Gear freighter, two 5-ton Synnestvedt, and two 1 1-2-ton Lansden wagons, make six or seven trips daily from the warehouse to the freight depots for the Southwest—a distance of two miles each way. One Commerce 3-ton gasoline truck does good service.

WILL ABANDON HORSED WAGONS

In talking with V. J. Heitmeyer, superintendent of the rolling equipment, it was learned that it will be the policy of the company eventually to do away with all horse-drawn vehicles. The company has found that the motor trucks do twice as much work as horse-drawn vehicles—and this concern is noted for its systematic economy.

"We still have thirty horses," said Mr. Heitmeyer, "but these could be eliminated if we had ten or twelve more machines. There is no doubt about the economy of the machines when they are properly taken care of. I think many users made the mistake of thinking that a motor vehicle does not need the same attention as any other piece of machinery. We have clearly demonstrated here that with proper care and supervision the motor truck is superior to anything else for freight hauling."

The Simmons company has its own garage, where Robert Fitch is in charge of the gasoline and electric vehicles. The drivers are paid wages slightly higher than the union scale requires. The operator of the 5-ton Couple-Gear truck receives $60 monthly, and the others in proportion.

It would be a revelation to many users of horse-drawn drays to take up a position some busy day, opposite the loading platform at the Simmons warehouse. One would see great, unwieldy-looking vehicles swung this way and that, backed into place with surprising facility, finally loaded high with all manner of hardware, and driven off at a fast rate to the freight depot. Sometimes he would see two of these 5-ton machines close together at the platform, scarcely occupying more space than one horse-drawn wagon of equal capacity would cover.

When the Lewis Publishing Company began to do business seven years ago, an attempt was made to utilize special street cars for the transportation of its enormous and heavy mail to the post office and trains, but the experiment was unsuccessful; it was too slow. Motor vehicles were bought, each one giving more satisfaction than the other, until now there are seven machines doing the company's work. No horses are employed. The equipment to-day comprises: one 5-ton Gibbs electric, two 3-ton Gibbs electric, two 1 1-2-ton Auto Berry electric, one 1 1-2-ton McRey electric and one 3-ton Reliance gasoline machine.

DEPARTMENT STORE DELIVERY

There is an opportunity in St. Louis to induce some of the department stores to take up motor delivery; several prosperous houses of this kind could operate motor delivery wagons to advantage. At the present time only one department store has taken up commercial vehicles extensively. This is Scruggs, Vandervoort and Barney, which at the present time operates eleven machines. Nearly all of the following have been in use for more than a year: one 3 1-2-ton Studebaker electric, four 1,500-pound Studebaker electric, five 1,500-pound Model R Logan gasoline cars and one 1,000-pound General Vehicle electric.

The gasoline cars are cared for by a competent man at the stables of the company, Laclede and Grand Avenues. The electric machines are kept in running order at the the gasoline cars running into the outlying districts and all machines were formerly on the horse-drawn wagons. Two trips are usually made each day by the machines; the gasoline cars running into the outlying districts and the electric machines operating in the best localities where the more fashionable part of the population resides and the streets are fairly good. In the suburbs where the streets are frequently un-made and usually heavy with mud, mules are employed. Until the suburban street conditions are better it is doubtful whether Scruggs, Vandervoort and Barney will abandon the use of beast-drawn wagons entirely. An employee of the company stated that the use of the automobile wagons by this store was still in an experimental stage.

The company has had very little trouble with the solid tires used, receiving practically a year's service from each one. Kelly-Springfield, Firestone and Morgan & Wright tires are all giving satisfactory results.

BEER KEG TRUCK OF ANHEUSER-BUSCH BREWERY

MANY MACHINES IN BREWERY SERVICE

The example of the Anheuser-Busch Brewing Association stands as one of the most favorable arguments for the use of the commercial vehicle that can be found anywhere. When first this great brewery commenced to use motor vehicles in place of horses, it was found necessary to charge a large part of the expense of the up-keep of the machines to the advertising account in order to make the books balance. For a time Adolphus Busch was in a quandary. He might have abandoned the use of the cars entirely had he not at someone's suggestion employed the best electric expert that he could find to take charge of his immense garage. After this step was taken conditions immediately began to improve, until now there is no doubt that the use of power-driven vehicles is something more than economy to this particular concern.

ANHEUSER BUSCH ELECTRIC BOTTLED BEER WAGON

Forty-five to fifty machines are in daily service. Approximately there are twenty-five 1-ton General Vehicle trucks, five 3-ton vans of the same make, six 2 1-2-ton machines of Anheuser-Busch make, seventeen 1 1-2-ton Pope-Waverly machines, made from a special design by George Marian so as to be 20 per cent. heavier than the stock vehicle, two Knox gasoline wagons of 1 1-2-ton and 3 1-2-ton capacity, one 3 1-2-ton American motor truck, and one 1 1-2-ton gasoline vehicle designed by Marian.

The 5-ton machines average 20 miles a day; the lighter cars average 25 to 30 miles a day. The majority of the machines are equipped with a twin tire (designed and patented by Marian) made by the Firestone company. The latter has given such unusually fine results that a company is being organized, it is understood, to put this type of tire on the general market.

A BUSINESS MAN'S EXPERIENCES.

A prominent user of a number of commercial vehicles whose range of vision extends further than the limits of St. Louis had some interesting things to say about the situation generally, but refused to allow his name to be used. He said:

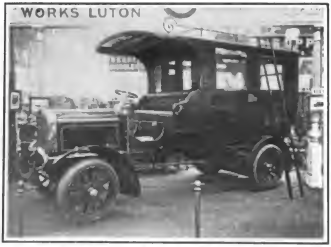
"From my experience with commercial vehicles, I should say that the thing that impresses me most is the tardy development of the motor vehicle for business use. I do not mean to say that excellent motor trucks are not on the market, but I do say that the pleasure car is very far ahead of the commercial vehicle in its present state. The heavier business wagons are much nearer perfection than the lighter cars, and the utility of the heavy vehicle is unquestionable even by the most enthusiastic horse owner whose natural bias favors the animal.

"Having had experience with several different kinds of machines, I should say that the use of motor vehicles in business entails more expense than does the employment of horses. Undoubtedly, however, there are superior advantages that come with the motor vehicle which usually balance the books. After a trial of both, there is no question in my mind but that the electric machine is superior for city delivery, while the gasoline machine is absolutely necessary for out-of-town hauling. The big 3- and 5-ton electrics that run along slowly, seldom stopping, are such a far superior means of carrying, that it is a surprise to me to find so few companies in this city using them.

"Under the present conditions in St. Louis—I refer particularly to the streets and unpaved dirt roads of the suburbs—this concern will not be able to give up the use of horses or mules entirely. There are mud holes through which our delivery wagons must pass where the extra weight of the motor vehicle is a serious disadvantage and on roads that include these un-made thoroughfares it is still necessary, I may say compulsory, for us to use horse-drawn wagons."

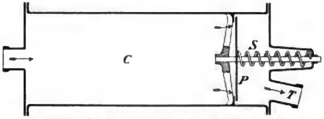
FEW "COMMERCIAL" EXHIBITS AT OLYMPIA SHOW

At the recent Olympia automobile show in London there were few exhibits which really could be classed under the commercial heading; the entire exhibition was almost completely composed of pleasure cars and their components and accessories. Among the complete vehicles shown there was an interesting type of hotel 'bus (here illustrated) built by the Commercial Cars Limited of Luton, England, and which they style a "Norfolk" car of the convertible type. The chassis used is that of the 2-ton truck of the same make and carries a 24-26 horsepower four-cylinder vertical gasoline motor. The body is finished in natural wood highly polished and varnished, the wood employed is walnut. The body is made in two distinct parts assembled at the level of the seat backs and when the upper half is removed the vehicle is transformed in an open body wagonette, making it highly suitable for hire to hunting parties or hotel patrons wishing to organize picnics or out of doors parties. When operated as a closed vehicle the car is fitted with all the conveniences of a high grade hotel or station omnibus, including a very strong baggage-carrying roof. A folding steel ladder shown in the illustration is part of the regular vehicle equipment. One noteworthy detail of design is the convenient location of the fuel tank filling tube prominently placed below and in front of the driving seat.



CONVERTIBLE OMNIBUS EXHIBITED AT OLYMPIA

Among engine and parts exhibits were noted the small Aster four-cylinder engines specially suited for taxicab work. These motors are of the now widely adopted type and cylinders cast in one piece and two bearings crankshaft. The dimensions are the metric equivalents of 3 by 4 inches and the power nominally is 14-16 horsepower. The valves are located all on the same side above a single camshaft and directly operated. All the piping is cast integral with the cylinder castings, except a short brass tube connecting the carbureter, the latter is located on the side opposite to the valves and cross passages are cast between the extreme and central cylinders to connect with the valve chambers. An Eisemann magneto is fitted on the valve side for ignition purposes and its driving shaft is extended forward to drive a centrifugal water pump. Plain unsplit friction metal lined bushings are used on the crankshaft and the flywheel flange is made removable.



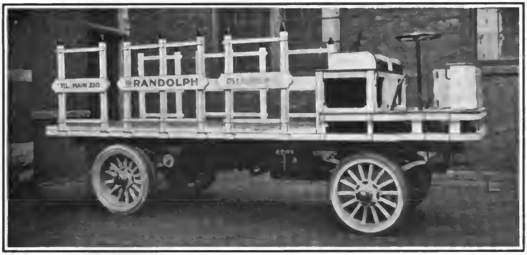
SECTION OF WHITE & POPPE SILENT MUFFLER

A special low-speed, four-cylinder engine was shown by White and Poppe, Ltd., intended for truck and 'bus work and developing 35 nominal horsepower. This engine has been designed with a special view toward long life and silent running. Fiber pads are inlaid in the valve actuating tappets to reduce noise in this mechanism. In connection with this engine the White and Poppe people recommend the use of their new muffler. In this apparatus, which the accompanying diagram illustrates, the exhaust gases are allowed to freely enter a large cylindrical expansion chamber *C*, at the opposite end they strike a large baffle plate *P*, practically consisting of an automatic valve the full diameter of the expansion chamber. A one pound pressure spring *S*, keeps this baffle normally closed, but this pressure is easily overcome by the gases which make their exit through this valve out to a small chamber where from a tube *T* carries them to the rear of the vehicle. This apparatus is claimed to be very silent; it, however, is left doubtful in the writer's mind if a smoky exhaust with the attendant oil and carbon deposits will not very rapidly impair its action.

The American Goodrich tires were shown in pneumatic form, with plain and non-skid treads for cabs

RANDOLPH FOUR-TON GAS MOTOR TRUCK

IN addition to the line of friction driven delivery wagons described in a recent issue, the Randolph Motor Car Company, of Chicago, is marketing a 4-ton gas motor truck. This vehicle is built along broad lines of what may be termed standard practice, it nevertheless is promised some features which make it of special interest for the prospective user. It is illustrated here in the form of a stake truck.



FOUR-TON GAS MOTOR TRUCK BUILT BY RANDOLPH MOTOR CAR CO. OF CHICAGO

The engine which is located low in the frame, below the driver's seat and the footboards, is a vertical four cylinder construction. The lever and stroke are of respectively 5 and 5 3-4 inches. The cylinders are cast in pairs with the water jackets and the valve chambers integral. The valves are all mechanically operated and accessibly located all on the same side of the engine, over the camshaft. This camshaft is an accurately finished and ground hammer forging and runs on three large Parson white bronze bearings. The connecting rods are drop forged, of liberal section and are also fitted with Parson metal bearings. The crankshaft which contains the crankshaft and also the camshaft is an aluminum casting and is directly bolted to a subframe hung from the main frame and extending to the rear of the change speed gear base. It is fitted with very large inspection plates. The engine lubrication is by force feed to the crankshaft bearings and by splash at a constant level to all the other parts. The overflow of oil from the crankshaft collects into a sump at a lower level wherefrom an eccentric driven pump sends it to the crankshaft bearings, the excess of oil works out of the latter and falls into the crankcase where it is taken up by the motion of the parts and distributed at all desired points.

Ample circulation of the cooling water is obtained by means of a large gear driven centrifugal pump. This pump is most accessibly located and very easily removed or dismantled. The water issuing from the engine passes through two large radiators located in the side panels under the driver's seat, where they are well protected from possible injury resulting from front end collisions. The fan cooling the radiators works in sheet metal guards which insure an even distribution of the induced air through the entire radiator surface, a point generally deficient in current practice. The side location of the radiators makes the amount of air available for cooling purposes independent of the speed of the vehicle and the results are satisfactory whether the truck be going up the steepest hill at a low speed or running at maximum speed on the level. A high tension magneto is fitted for regular running and a spare battery system is provided for ease in starting or cases of emergency.

The engine control is by spark and throttle, the actuating levers being conveniently located on the steering pillar.

The clutch is of the contracting band type, running in oil in a closed casing. It can be very easily adjusted and is extremely smooth in action.

The change speed gearing provides for four speeds forward and one reverse. It is operated on the selective principle, and any set of gears can be brought in mesh without passing through the intermediaries.

The gear box is a well ribbed and perfectly rigid aluminum casting, it also contains the differential and the bevel driving gears. It entirely rests on the subframe mentioned in connection with the engine, issuing perfect and constant alignment between these two important units. The bearings are all plain and made of the same material as employed for the crankshaft. Their lubrication is by an efficient system of forced oiling which insures a constant supply of clean oil, the practice of using over and again oil having already served for gear box lubrication being condemned by the makers on account of the metallic particles carried in the oil and acting as abrasives for the bearing surfaces. The jackshafts projecting outward to the chain sprockets are completely enclosed in stiff steel sleeves rigidly bolted to the gear box at one end and supported at the other end in the pinion brackets bolted to the main frame sides. This forms a single unit of the whole transmission and drive, insuring perfect alignment and complete enclosure of working parts under any and all conditions. The gears and shafts are of suitably treated nickel steel and the sliding sets run on squares cut on the shafts.

To provide for possible distortions of the subframe between the engine and the gear box these two units are connected by a fully jointed nickel steel shaft. The joints in this shaft are easily dismantled without disturbing any other part so as to facilitate independent removal of the engine or gear box.

The side chain drive is effected by means of strong roller chains with large bearing surfaces. The distance between the sprocket centers has been reduced as much as accessibility could permit to insure the maximum of chain efficiency.

The brake drums are bolted on the rear wheel spokes, independently of the hubs to avoid fatigue at the center end of the spokes. The wheel brakes are of the internal cam expanded type and are lined with "Thermoid" fabric. They are operated by the right foot pedal and are intended only for emergencies. The service brake is located on the gear box shaft and is actuated by pressing the clutch pedal right home. This connection of both brakes to pedals makes only one side lever necessary for the operation of the change speed gear.

Both axles are one piece forgings and are fitted with roller bearings. The rear axle is of square section and the front axle is I-beam. The steering gear is a specially strong screw and nut construction, running in grease.

The main and subframe are of rolled steel; the main frame sides are bent in at both ends with large radius corners and meet at the center line of the truck, this avoids the use of end cross members and makes a stronger construction devoid of riveted gusset plates and similar complications. It also adds to the general appearance of the vehicle. The frame is mounted on half elliptic springs. These are made of special alloy steel and should meet with success the severest service. Both ends of the rear springs and the rear ends of the front springs are looped and slide freely on hard bearing surfaces as clearly seen at the rear end of the front spring in the illustration.

The wheels are wood or steel, as desired, and uniformly are of 36 inches diameter. Solid tires 6 inches wide, singles, are fitted at the front and 4-inch twins at the rear wheels.

The wheelbase is 124 inches and the tread 58 inches. The trucks are supplied with a full equipment of lamps and tools.

FULTON 1,500 POUND MOTOR WAGON

After three years spent in experimental work, during which time several forms of revolving motors were tried out and finally abandoned, the Fulton Motor Car Co. of New York has brought out a 1,500 pound wagon and 1 ton truck. In the 1,500 pound wagon, choice of either air or water cooled motors of the same size is offered, in the 1 ton truck, the water cooled motor only will be used.

The same general style of construction is followed in both vehicles, with the exception of the spring suspension, which in the 1 ton vehicle is platform rear and semi-elliptic front.

Our illustration shows the 1,500 pound wagon, with the double opposed 5 by 4 1-2 inch, 16 horsepower, air cooled motor mounted below the dash, with a hinged grill door in front. Each cylinder is cooled by an individual fan belt driven from the main shaft; the bearings of these fans as well as those in the transmission case are Hess-Bright. All cylinders used in these wagons, both air and water cooled, are made interchangeable one with the other. The bearings of the crank as well as the cam shafts are of large size, a Schebler carbureter and Splitdorf timer are used.

A New York Gear Works planetary change speed gear set is housed in a dust and oil proof cast-iron case with adjustment screws at the side, and the power is transmitted to the countershaft through a drive shaft provided with two cardan joints.

The countershaft housing is of large size and well trussed beneath; in it are mounted Hyatt roller bearings with ball bearings to take the end thrust. Like the change speed gear case, it is oil and dust proof, and all gears run in Non Fluid Oils; final drive to rear wheels is effected through double side chains.

A foot brake operating contracting bands faced with Raybestos apply on the rear wheels, the other foot lever controls the reverse and a hand lever at the side of driver operates the two speeds forward.

FULTON 1,500-POUND GAS MOTOR WAGON

The wheelbase is 92 inches and the tread 56 inches. The frame is of pressed steel and measures 124 inches by 36 inches. Truss rods connecting both axles are fitted. The axles are of nickel steel with Timken roller bearings front and rear; springs of the wagon are full elliptic.

A Werner steering gear with spark and throttle mounted above the spider is used. Below the seat is a copper 14 gallon gasoline tank and in a box in the dash a 10 pint Lavigne oiler operated by a belt connection to the main shaft and provided with nine leads to the engine cylinders, crank shaft, crank pins, change speed gear case bearings and bevel pinions in countershaft. A Splitdorf magneto mounted at the side of the change speed gear case, and operated by a short chain connection to the drive shaft, is supplemented by dry cells for furnishing ignition current. These cells are carried in the dash. Firestone tires are fitted to the artillery type wheels.

PARR FRICTION CONE DRIVE TRUCK

After twenty years' experience in wagon building, the Parr Wagon Company of Pittsburg has delivered the first of its three-ton gasoline motor trucks to James A. McAteer & Sons, Pittsburg's largest wholesale grocers.

While following standard construction in the main, this truck differs considerably in its transmission system, which is of the friction cone type. The truck has a wheel base of 111 inches, with 60-inch tread, the front wheels are 34 inches and the rear 36 inches, fitted with solid rubber tires. Timken 2-inch I-beam front and 2 1-2-inch square rear axles are used. The frame is channel steel rounded at the ends and the joints welded and reinforced by riveted plates. The front springs are semi-elliptic and the rear ones of the platform type.

TRUCK BUILT BY PARR WAGON COMPANY

A Waukesha four-cylinder motor is mounted beneath the driver on a three-point suspension and from a cone clutch the power is transmitted from the motor through spur gears to two parallel shafts running lengthwise with the frame, on each of which are mounted three friction cones with fiber facings. The spur gears cause the friction cone shafts to revolve in opposite directions and the cones carried by these shafts bear against two large bevel cast-iron friction wheels keyed on shafts, to the outboard ends of which the chain sprockets are attached. The forward cone, operated by a foot lever, controls the reverse, the second and third cones (low and high speeds) are operated by a hand lever at the side of the driver. Equalizing bars connect both cone shafts so that the pressure against both of the friction wheels is uniform; in rounding corners, the slipping of the friction cones takes the place of the usual differential gears. The friction transmission is carried in a strong cast steel case strongly bolted to the truck frame. The bearings are of large size and made of bronze.

CHASSIS OF PARR FRICTION DRIVE TRUCK

The most exacting tests have demonstrated that this friction transmission will take full loads up the steepest grades in Pittsburg without slipping and the full rolling contact of the cones is so gradual that no undue strain is placed upon the various members in starting. A foot-brake operating expanding rings and an emergency hand-brake connecting with contracting bands on the rear wheels furnish a braking surface of about six square feet; all brake surfaces are covered with "Raybestos." The speed of the ruck varies from 4 to 10 miles an hour. The radiator forms part of the dash; spark and throttle control is mounted on the steering column below the wheel, and beneath the driver's seat is located a 20-gallon gasoline tank.

Grades of 10 per cent. abound in Pittsburg, and James A. McAteer & Sons, like Joseph Horne Co., dry goods merchants, and other progressive concerns have found horses unequal to the transportation requirements of their business, and are operating motor trucks extensively.

RELIABILITY OF MOTOR 'BUSES

The Bolton Corporation, which operates electric railways outside of Manchester, England, found that a portion of the route could not be operated profitably by trolley cars and last February decided to put in service a 36-horsepower gas-motor double-deck omnibus, built by the English concern Commercial Cars, Ltd. During the following six months the bus covered about 10,000 miles, making daily trips without a single road failure or delay on the route for any mechanical reason. The stretch of road on which it is operated is very hilly in places and badly paved with granite blocks. On week days a regular time-table schedule was followed, and on Sundays the omnibus made special trips to various pleasure resorts, making a round trip for that day of about 80 miles. The fuel consumption during the period of operation figures out about equal to five miles to the gallon.

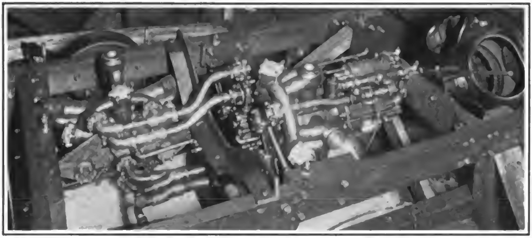
IN PHILADELPHIA the council's committee on police and fire recently appropriated $25,000 for the purchase of five motor patrol wagons. Originally an appropriation of $50,000 had been figured on, but as there are now in service thirty-two horse-drawn wagons in the thirty-seven police districts it was finally decided to purchase motor vehicles only for the districts which have no wagons.

THE TOTAL MILEAGE of good roads constructed in New York State in the past year is 820 miles, or two and one-half times the mileage constructed in 1907, and over five times that of any previous year. The 1908 mileage exceeds by 153 miles the total amount of roads built previous to January 1, 1907. There are approximately 500 more miles under contract and 1,000 miles awaiting contract. State Engineer Skene claims this to put New York State ahead of New Jersey or Massachusetts. Of the $50,000,000 of State money voted by the people for this work, $11,000,000 has been appropriated by the Legislature.

MANLY HYDRAULIC DRIVE FOR MOTOR TRUCKS

A NEW transmission device intended for use in self-propelled vehicles in general and trucks in particular is being placed on the market by the Manly Drive Company of New York. This transmission is based on the hydraulic principle which has long been the source of many unsuccessful researches in the same direction. The apparatus offered by the Manly Drive Co. is the product of ten years of work by Mr. Manly. It was inspected by us at the company's laboratory in Brooklyn, where it is shown in operation on the testing bench and on a truck of 4 tons gross weight, driven by a 12-15 horsepower engine, and carrying a load of sand and rock.

Concisely described the device consists in a pump driven by the engine, this pump sending oil to motors where it generates rotary motion as does steam or the explosion of a combustible mixture in the common forms of engines. For use on trucks there are either two motors each driving one rear wheel through chains and sprockets or one single motor driving the differential of an ordinary line axle. The truck shown by the Manly Drive Co. is of the two motors, chain driven type.



MANLY HYDRAULIC MOTOR TRUCK DRIVE FITTED TO TRANSMISSION TESTING FRAME

The oil pump driven by the engine consists of a number of cylinders disposed radically around a common single throw crankshaft. In the models at present made there are five such cylinders; in a type which will be evolved for use in taxicabs this number will be reduced. The peculiarity of this pump resides in an extremely simple and strong variable throw crankshaft, which permits of varying the quantity of oil delivered without changing the speed at which the pump is driven. When the crank pin is brought to coincide with the axis of the crankshaft no oil is delivered and the pistons remain stationary. The motors consist of five similar cylinders also disposed around a common crankshaft from which the power is taken. This crankshaft, however, is of the usual fixed throw variety.

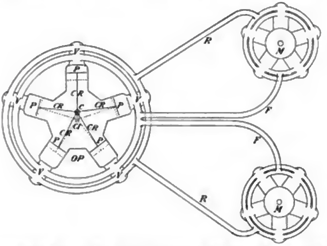
Let now the action of the device operating a truck be considered.

With the pump's crankpin at center we have seen that the pump does not deliver any oil. This corresponds to having the clutch out in an ordinary vehicle. If the crankpin is gradually moved outwards oil will be supplied to the motors in proportion to the amount of eccentricity given to the crankpin. Supposing the total surface of the pistons in the motors to be equal to the total surface of the pistons in the pump and the throw of the crankpin in the pump to be one-fifth of the throw of the crankshafts in the motors it will take five revolutions of the pump's shaft to fill the cylinders of the motors and produce one revolution of their crankshaft; the system will be equivalent to a pinion driving a gear wheel of five times its number of teeth. If the throw of the pump was half the throw of the motors the system would correspond to a pinion meshing with a wheel twice its size and so on. Thus it can be seen that to the infinite number of positions which can be given to the pump's crankpin corresponds an infinite number of speeds for the motors, the speed of the pump and of the engine driving it remaining constant. This gives an infinite range of speeds to the vehicle from zero to the maximum which the load and the power of the engine will permit. The same result is obtained in backward motion by reversing the flow of oil to the motors this starting them in the opposite direction.

Reversing the motor action introduces a braking action of instantaneous response. The control of the three elements of driving: clutch, speed change, brake, are thus concentrated in one single action, that of operating back and forth the lever in the driver's hand which controls the throw of the pump's crankpin.

Oil, like all liquids, not being compressible the response is instantaneous and irresistible. Moving the crankpin to alter its throw against the pressure of the oil would be impossible for a man's strength; this is accomplished by the oil itself through a suitable action of valves and by-passes, and the manual exertion is practically nil, merely consisting in guiding the oil in its work. It is evident that if oil is pumped there is nothing which can stop the action of the motors save the bursting of the apparatus, also if the cranpin is at zero throw the wheels are absolutely locked since the motors can find no outlet for the oil they contain.

In this resides the fundamental and all important difference between the Manly drive and the numerous hydraulic clutches which have occasionally appeared on the market. In the apparatus here studied the effort of the oil is irresistible and no matter what the speed may be the entire power output of the engine is transmitted to the wheels save for what little is lost in overcoming friction. In technical terminology this is expressed by saying that the output is constant, the torque being inversely proportional to the speed. In ordinary hydraulic clutches the speed variation is provided by short-circuiting a varying quantity of oil, corresponding to slippage in a friction clutch, the torque staying constant and never being greater than the engine torque; this fails to answer the purpose of a speed-changing mechanism, while the Manly drive does it with almost theoretical perfection.



DIAGRAMMATIC SKETCH SHOWING PRINCIPLE OF THE MANLY HYDRAULIC DRIVE.

O. P.—Oil pump driven from engine crankshaft.
M. M.—Oil motors connected by chains or shafts to road wheels and driven by the oil which the pump *P* supplies.
F. F.—Oil feed pipes to motors.
R. R.—Oil return pipes from motors to pump.
C.—Crankpin of oil pump.
Cl.—Crankpin of oil pump brought at center of motion. The entire mechanism is at rest and locked.
P.—Oil pump pistons.
C. R.—Oil pump connecting rods.
V.—Oil pump valve chambers.

In reversing pipes *F F* become return pipes and pipes *R R* become feed pipes.

A separate set of oil pipes is provided for each motor, in order that the liquid following the path of least resistance, differential action be automatically produced without any gearing arrangement. In the oil pump and motor as actually made the valve chambers are by the side of the cylinders to avoid unduly large over-all dimensions of the mechanism. They were located in the cylinder heads in the diagram for the sake of clearness.

Bursting of the apparatus is improperly naming what would happen if something gave way, as oil being compressed but not changed in volume there would not be any expansion or explosion as in the case of a steam boiler; the fluid would simply leak through the crack opening with more or less force. To avoid the possibility of this or of straining the mechanism a safety valve is fitted, registered at 2,000 pounds per square inch pressure, which if this pressure is exceeded short-circuits the surplus of oil and returns it to the pump without passing through the motors.

In the accompanying sketch is shown a diagrammatic arrangement of the apparatus with a single main pump supplying fluid to two motors.

In the photograph reproduced is shown the pump driving a single motor, with the connections for the second motor plugged up and the apparatus represented is that which is used at the maker's laboratory for the purpose of demonstrating the efficiency of the system. The control lever is clearly seen at the outer end of the pump.

If this device proves commercially successful, and if it operates as successfully in every day's work as it does in the experimental machine presented by its makers it certainly should eventually prove a considerable improvement over any existing method. In trucks it would make the handling of the vehicle even simpler to the obtuse man than that of horses, and on the face of its possibilities its development should be watched with interest.

SQUARE HOLE BORING MACHINE

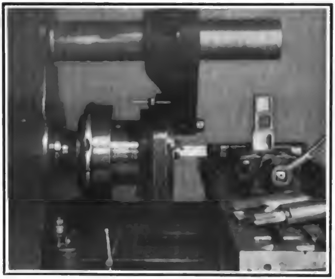
In the accompanying illustration is represented a fixture, for the boring of square and polygonal holes with sharp corners, which should be of interest to the commercial vehicle manufacturers.

This appliance can be mounted on any type of machine tool, whether it be a lathe, a milling machine, or a drill press. The illustration shows it in operation on a horizontal spindle milling machine.

The work is performed by a rotating drill suitably guided as a milling cutter by a guide or matrix embodied in the apparatus. The cutting edges are on the end of the tool, as will be gathered from the separate tools shown in the right hand corner of the illustration.

For square hole boring the drill has a three-cornered cylindrical body and a corresponding three-cornered straight shank, the faces of these triangular bodies are segments of a circle, struck from the opposite angle; their radius is equal to the side of the square guide in which the shank works, thus insuring constant guiding and contact of the three corners. The tool thus mounted cuts a square hole with very slightly rounded corners. If a perfectly square hole with sharp corners is desired one of the angles in the shank is slightly rounded off to an empirically determined profile. Triangular and polygonal holes can also be cut to any shape or size with sharp or rounded corners.

The drill is driven by the device itself which has the general form of a chuck. To do commercial work with this machine, it is necessary to have as many different drills as there are sizes of holes to be drilled, but the guide in the device is adjustable to a wide enough range of sizes to make only one chuck necessary.



SQUARE HOLE BORING APPARATUS IN POSITION

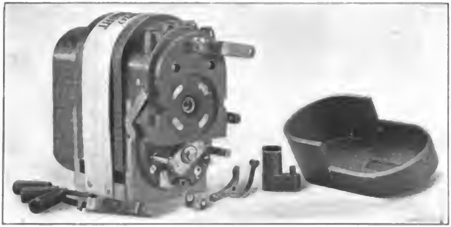
This tool is marketed in the United States by the Radical Angular Drill and Tool Company, of 114 Liberty street, New York. The invention hails from Germany and is used over there in all the largest shops including the famous Krupp factories.

ROYAL TAXIMETER FOR MOTOR CABS

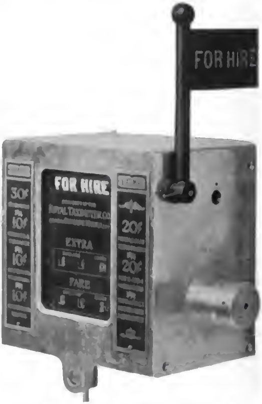
A new taximeter is about to be placed upon the market by the Royal Taximeter Co., 149 Fifth Avenue, New York, under patents of Chas. Siemens and J. L. Myers. The instrument weighs but 7 1-4 pounds, its outer case being of aluminum. With the exception of "extras," all registering operations are performed on one shaft. A knob on the back of the taximeter is turned to register extras, and the upright flag at the side of the instrument is pushed down like others, when customer enters the cab. The instrument is irreversible and cannot be tampered with. A clock running continuously and which operates in conjunction with the usual flexible shaft registers the amounts due. The face plate of the taximeter displays the rates as well as the extra charges. These instruments will be leased to the operating companies.

HESS-BRIGHT HIGH TENSION MAGNETO

The Hess-Bright Manufacturing Company of Philadelphia, well-known in the ball-bearing trade, is bringing out a new magneto imported from Germany under the Hess-Bright name. This machine is claimed to have certain special features of merit distinguishing it from the usual types. In most types of magnetos the spark intensity is maximum for one position only of the armature, and if the contact-breaking point is varied to produce the spark advance or retardation, and thus does not register with the point of maximum intensity the spark produced is very feeble. In the Hess-Bright magneto it is claimed that the spark position can be altered throughout a range of 65 degrees with absolute spark uniformity. This machine is also said to produce an adequate spark at a speed as low as 40 revolutions per minute, which is a quite remarkable performance. The primary and secondary windings are separate in this machine as this has always been admitted as a safeguard against insulation breakdown. In the accompanying illustration the Hess-Bright magneto is shown with the cover as well as all the parts likely to need occasional examination removed, this can be done with the fingers only and without the help of any tool.



HESS-BRIGHT MAGNETO WITH COVER AND PARTS REMOVED



EXTERIOR VIEW OF ROYAL TAXIMETER

Briefly putting it, this magneto seems to embody all the best approved features of the most modern practice and its performance on the market should be watched with interest.

Residents of Mt. Airy are planning a motor bus line to Cincinnati because efforts to have the Cincinnati Traction Company extend the Colerain avenue route to Mt. Airy have failed. Samuel C. Cox is forming an organization, with $7,000 capital, and within a few days it expects to have a 60-horsepower machine running from Mt. Airy to Fourth and Race streets, Cincinnati. The fare from Cincinnati to Virginia avenue, the end of Cummingsville, will be 5 cents, and from that point to the northern end of Mt. Airy an additional 5 cents. Freight will also be hauled. The machine will seat 22 persons and make the trip in 40 minutes—less than the time it would take by car.

In France sales of commercial vehicles are usually made direct from the factories. Traveling salesmen are employed by the builders to visit probable buyers of machines. These salesmen are paid a commission on sales and traveling expenses at a fixed rate per day. This latter is a usual French custom.

HOW TO OPERATE ELECTRIC COMMERCIAL VEHICLES*

Practical Instructions for Drivers, Batterymen and Superintendents of Garages in the Manipulation of Electric Vehicles and Maintenance of Their Components to Ensure Full Efficiency—Care of Storage Batteries

THE operation and care of an electric motor vehicle is no more of a task than driving and stabling a horse equipment. Use judgment in driving. Do not overload nor overspeed. Keep the vehicle and its power plant clean and in good adjustment. Keep the battery in good condition and properly charged.

Controller.—The controller cylinder, under the seat, is revolved by a handle on the seat. Turning the controller changes the connections of the motor and varies the speed of the vehicle, similar to a street car controller.

In starting, time must be allowed for the car to attain a certain speed before moving the controller to the next speed point. No pause should be made between points and the car should not run longer than necessary on the first and second point which includes a resistance in series with the motor.

Do not keep the controller handle in continuous motion as this is unnecessary and increases the wear and strain on all parts of the vehicle.

Always open the main switch and set the brakes before leaving the vehicle alone. This disconnects the motor from the battery and prevents the vehicle from being started accidentally.

LUBRICATING THE CONTROLLER

Occasionally oil the controller shaft and all bearings in the controller operating mechanism, particularly the roller of the star wheel pawl.

Keep the surfaces of the controller segments or contact block clean and bright with fine sandpaper and a slight amount of vaseline but wipe off all but the little required to keep the segments bright and smooth.

See that the controller fingers give a fair amount of pressure on the cylinder segments and bear evenly across their width. The fingers may be fitted to the segment by moving a strip of sandpaper between the segment and the finger (sanded side against the finger). Be careful not to sand so much surface that it will bridge the gaps between the sections of a ring or segment and thus make improper connection of different running points.

If the controller has adjusting screws for regulating the drop of the finger between the segments, see that this drop is about 3-32 inch. This is especially important on the last or running point of the controller. It need not be considered on a controller having fiber bridges between the segments where no drop is necessary. In all cases firm pressure and good contact should be maintained.

Do not allow waste, tools, etc., to accumulate under the controller.

Motors.—The only parts of the motor that need attention are the commutator, brushes and the bearings. The motor should be inspected at least once a week and the commutator should be examined when the motor is running with rear wheels jacked up to detect any sparking which may be due to a dirty or worn commutator or broken brush. The commutator brushes and brush holder should at all times be kept perfectly clean. They may be lubricated slightly with a very little vaseline applied while the motor is running.

SURFACE OF THE COMMUTATOR

The commutator in normal conditions presents a smooth, brownish surface. If blackening appears after operation it may be due to sparking or wearing. The remedy is easily applied when the trouble is located. If brushes are too loose, increase the spring tension. If brushes are badly burned, broken, worn down or make poor contact, replace them with new brushes, sandpaper to a good fit and smooth the commutator surface with sandpaper while running. Use No. 1 or No. 2 sandpaper. Do not use emery. If brushes are tight or welded in holder and do not work freely on commutator surface, put in new brushes. If commutator becomes badly worn or shows irregularity it should be renewed or turned down to a smooth even surface in a lathe.

If the commutator flashes, the trouble may be caused by a broken wire or coil, producing a greenish flame and burning the two bars diametrically opposite each other. This burning should be stopped by putting a jumper of solder or small wire across the burned bar, connecting the two adjacent bars to each other until a complete examination can be made and the broken connection permanently repaired. A flare at the commutator may be caused by a short circuited field or a field coil improperly connected. A short circuited field coil can be located by testing the voltage drop in the coils by means of a voltmeter. An incorrect field connection can be detected by a pocket compass which will show adjacent fields to have the same polarity if fields are incorrectly connected. Alternate fields should be north and south when field connections are correct.

Brakes.—Examine the brakes every morning. The brake band is faced with leather, which must be renewed before wearing down to the metal.

TAKING UP WEAR OF BRAKES

Two adjustments are provided for taking up wear on brakes. The first is inside the spider on each rear wheel and is used to equalize the brakes with each other. To adjust, remove cotter pins, free from bearing pin and unscrew the toggle jaw to increase or the reverse to decrease pressure on the brake shoe. This adjustment is seldom required except when one brake shoe wears faster than the other.

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*These instructions have been issued by the General Vehicle Company of Long Island City, and while they are intended principally for the guidance of users of this company's machines, they are in the main applicable to electrical commercial vehicles in general. They are written in simple language, easily understood by any one having only the most elementary knowledge of electrical apparatus, and their study will be found profitable not alone by employees who have the immediate care of vehicles but by owners as well.—EDITOR.

The second brake adjustment is on the rod connecting the foot lever with the equalizing lever under the rear of the car and affects both brakes. To adjust, screw on the toggle jaw to increase and unscrew it to decrease brake pressure.

The brake toggle should never be adjusted so tight that less than 1-8 inch space shows between brake shoe and brake drum when brake is in "off" position. If the brake does not hold firmly and is found to be tight enough, it may be greasy or oily and should be washed out with gasoline.

Do not apply the brakes suddenly except in emergency, as a sudden stop may strip the tires or do other damage. A steady braking pressure is usually possible.

Tires.—Tires should be watched to detect signs of looseness or other weakness. Prompt repairs of a slight nature will prolong the life of the tire. Do not allow oil or grease to reach or remain on any rubber tire. Oil rots rubber. Avoid *unnecessary* exposure of tires to extreme heat. Do not keep in hot sun when unnecessary. Start and stop gradually. Strains are bad for tires as for anything else. Avoid running in car tracks. It is hard on tires.

TREATMENT OF CHAINS

Chains.—Once every month take off the two roller chains driving the wheels, wash in gasoline until clean, then boil in hot tallow or heavy grease. No other lubrication is needed here. These chains should show some slack when running, but not much. Too loose or too tight chains may jump off, stretch, wear out, or run hard. The motor chain should be lubricated twice weekly with a heavy grease. Engine grease No. 2, made by the Vacuum Oil Company, is recommended.

Bearings.—The ball bearings on the motor and the roller bearings on the wheels and countershafts are properly adjusted before leaving the factory. They need no further attention for six months, except to clean in kerosene or gasoline and repack with Non-Fluid Oil No. K-000 once a month, or oftener if inspection shows this to be necessary.

Do not set up the wheel bearing so tight that it resists rotation; keep it slightly slack. The wheels should be adjusted so that a little end shake can be felt, just enough to show the bearing is not jammed. Loosening the axle nut one-half turn after the wheel is set up tight is usually sufficient.

Countershaft bearings may be adjusted for wear by adding thin steel adjusting washers between bearing cones and sprockets. With sprockets off both ends, adjust one end until just a little end shake can be felt with the sprocket on this end. Then adjust the other end by adding washers until the shaft turns hard after the sprocket is drawn up tight. Then take off this sprocket, remove one washer and replace the sprocket.

The differential should receive the same inspection and lubrication as the bearings. Screw down grease cup one turn every morning and oil other parts twice weekly.

BALL AND ROLLER BEARINGS

Do not use graphite. Do not take a bearing apart. Do not let acid get into a bearing. Do not believe the man who says a roller or ball bearing will run safely without oil or grease. Do not put in new balls or rollers in an old bearing. Get a new bearing for use while the old bearing is being renewed at the factory.

Steering Gear.—Keep all steering gear bearings properly lubricated. The sector shaft bearing is oiled from the top by removing the oil cup cover. Pinion and sector should be well lubricated with heavy grease. Keep all nuts and joints in good adjustment to prevent lost motion.

INSPECTION OF BATTERY

Battery.—All storage battery manufacturers give complete and detailed instructions on the operation and care of their batteries. Such instructions are not the same for all types of batteries, and it is not practicable to include them here. It is, however, important to observe the following simple requirements in addition to those given by the battery manufacturers.

In charging always have the main switch open, the controller handle in "off" position and the brakes set tightly. Be sure the controller is still in "off" position before closing the main switch after charging.

To get at the battery, to adjust the solution, remove the battery compartment door, disconnect the wire terminals from their sockets or crate terminals. Draw out the crates, one at a time, allowing the front end to rest on a strong support of the proper height. In reconnecting the terminals after replacing the crates, be sure to make the connections the same as before. Also see that all contact surfaces are perfectly clean before making connections.

The battery should be inspected regularly not less than once a week. Even if no adjustments are found necessary such regular inspections should not be neglected.

If cells are removed from the crate, be sure to replace them in exactly the same position as before removal. Reversing a cell will ruin it and decrease the power of the battery.

Give the battery as much consideration as you would a horse. A neglected or abused battery cannot do its best work and will not last as long as one properly used.

Read and understand and apply all the instructions given for the care and maintenance of the battery used in your vehicles. It is to your best interests and no more than fair to the battery and the vehicle.

A sudden severe electrical strain upon the battery, due to starting too suddenly under load, may burn out the lead connecting straps between cells. This can be bridged over temporarily by wrapping bare copper wire around the straps to enable the vehicle to continue its trip. This seldom occurs and should be repaired promptly by "reburning" according to battery instructions.

RULES FOR LEAD STORAGE BATTERIES

Keep battery clean, jars, straps, terminals and connectors. It will prevent trouble from leakage and short circuits. Dirt causes leakage of liquid and electricity. A piece of metal, a nail or a tack in a cell will ruin it. Extra water or improper liquid will weaken the battery. Keep all bolted connections tight.

Keep the electrolyte (battery liquid) at the proper height above the battery plates and at the proper specific gravity. Use only pure water to replace evaporation. Never add acid except under conditions explained in battery maker's instructions. Do not allow sediment to get up to the bottom of plates.

Always use direct current in charging batteries and charge in the right direction. Do not overcharge, as this injures battery and will not give additional mileage.

Do not undercharge and do not charge at an improper rate.

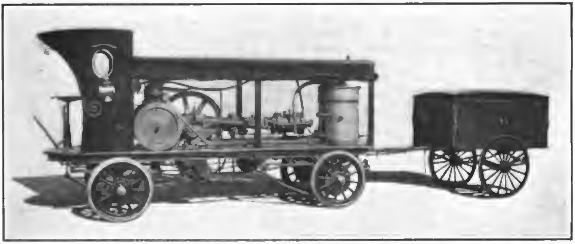
Do not discharge below 1.7 volts per cell and do not allow battery to stand completely discharged many hours. Give at least a partial charge and do not discharge until the full charge has been completed. A short charge is allowable when necessary in the middle of the day to increase the day's mileage.

FOLLOW BATTERY MAKER'S INSTRUCTIONS

In charging follow battery maker's directions intelligently. Do not allow battery temperature to exceed 100° F.: reduce the charging current or allow the battery to rest and cool. Do not allow a naked flame near battery while charging or immediately after, while gas is arising.

If there is any lack of capacity in a battery due to low voltage cells, do not delay in locating and bringing them back to normal condition. Take voltage readings while the battery is being charged or discharged; if taken while the battery is idle they are of little or no real value.

If batteries are to be idle for some time consult battery instruction books for directions as to the proper way to prepare for rest.



VACUUM & COMPRESSOR COMPANY'S SELF-PROPELLED HOUSE-CLEANING OUTFIT WITH TRAILER

SELF-PROPELLED HOUSE CLEANING PLANT

ALTHOUGH only a comparatively recent invention, the perambulating house cleaning outfits which are a common sight in city streets were at first transported from place to place by horses. Of late, however, the most improved outfits are invariably motor driven, and an excellent example of modern practice is shown in the accompanying illustration of a self-propelled vacuum and compressed air house cleaning plant, built by the Vacuum and Compressor Company, of Toledo, Ohio. The plant is mounted on a regular motor vehicle frame supported by roller bearing axles, with artillery type wheels shod with solid rubber tires. On this frame a vertical twin cylinder gasoline engine is fitted, which is used both to drive the vehicle when moving about and also to operate the combination air and vacuum compressor when the plant is stationary. A trailer hitched on behind carries the necessary tubing and tools for house cleaning. In the construction of the machine small attention is, of course, paid to finish for the sake of appearances, but the parts are well proportioned and very carefully machined out of good material, so as to insure durability.

When the motor is used to propel the vehicle the power is transmitted through a selective type of sliding gear set, giving two speeds forward and reverse, to the rear wheels, which are driven by side chains. And at full speed on level ground the rate of progress is about ten miles an hour. As the plant has to work for long periods without stopping, when engaged in house cleaning, it is necessary that all the wearing parts be of liberal dimensions and that correct design shall insure efficient lubrication and cooling of the motor. All this has been worked out in a very practical way.

This particular outfit can be used not only for house cleaning, but for operating pneumatic tools, such as riveters and drills, and also for cleaning the exterior of buildings by the sand blast process.

At the rear end of the chassis there are two vertical tanks, one in which the compressed air is stored and the other a collecting or vacuum tank connected to the air pump by a manifold and suction hose. Both of these tanks are fitted with safety valves and gauges. The driver's seat is covered by a cab, which is finished in coach style, with plate glass oval windows in the sides. Roll-up curtains are fitted to the top, so that if need be the machinery compartment can be entirely enclosed. A number of machines of this type are in successful operation in various parts of the country.

NEW YORK OWNERS FIND TAXICABS PROFITABLE

Investigation Shows Constant Increase in Number of Machines Operated to Satisfy Public Demands—The Driver's Viewpoint—Types of Men Employed as Drivers—Data on Costs of Operation

RICHARD G. CHAMBERS

A COMPREHENSIVE survey which has just been completed amongst the principal taxicab interests in New York City more than ever conveys the impression that the motor vehicle has proved a revolutionizing factor in passenger transportation.

In the past few months we have had occasion to announce a number of undertakings which prominent men and concerns in the livery trade contemplated. In every instance but one, the men visited gave the proverbial impression of patting themselves on the back in congratulation for their wise move. The only exception was met in a case where the garage organization and the business system gave instantaneous evidence of shocking deficiency; suggesting that had the company's horses been treated in a like manner there would have been an imperious need for a special motor truck service between the stables and the boneyard. In every case, save this special one, the results obtained have been so gratifying that additions to the number of vehicles used are contemplated as rapidly as capital or storing space increase will allow. The fact, in three different cases, men who had devoted their life's work to the carrying on of livery business with horsed vehicles, declared without provocation from the interviewer, that within the coming five years the horse cab would have entirely disappeared from the streets of cities.

THE PUBLIC'S OPINION

This is but the owner's opinion, the public's opinion is well expressed by the fact that the demand for taxicabs is continuous and entirely out of proportion with what the demand for horse cabs was before the appearance of the motor vehicle.

The cab livery business was practically non-existent in New York in the horse days, considering the population and in comparison with what it was in the European capitals where cabs have sometimes been as many as one per hundred inhabitants. The conditions, however, are rapidly altering and it is expected that together with the disappearance of horses, the taxicab will popularize a mode of transportation with which the American public had so far had little opportunity of familiarizing itself. It is evident that the present rates, although quite reasonable considering the conditions existing, will be lowered in the future; such a move is, however, uncalled for at the present, the demand being more than ample for the relatively small competition existing. That the demand is ample is shown by the fact that a large stable operating fifty-one motor cabs, besides its horse equipment, claims to never have more than twelve vehicles disengaged for any length of time during the day and evening hours.

OPINIONS OF DRIVERS

Occasional talk with drivers disclosed that on their side too the business is highly prosperous. Many of them are former private chauffeurs, and sometimes commanded high wages on account of their capacities. Every one finds the cab business an improvement in every way over the old job. One in particular, whose experiences might be quoted as a fair example, had been driving big touring cars for five years for the same owner, receiving a very good salary for his work. He now makes more money by running a taxicab for a large New York company, and having been in this employ for almost a year now contemplates the purchase of two machines which he will exploit for his own account in partnership with a fellow-driver. The gasoline used is generally paid for by the driver, the cab-operating concern charging 12 cents a gallon. New rules have been enforced, by which the return trip from any point is not charged to the patrons; this, at first sight, might have been considered as a disadvantage for the driver who has to stand the fuel expense for his return home. It, however, appears that they find this of advantage to them.

Long out-of-city trips to New Jersey, Long Island, and distant suburban centers have become more common since the new rule and the drivers prefer collecting a big fare for these trips and returning at their own expense, rather than taking short runs in town with intervals of waiting which are a loss of time more costly than a loss of fuel. Besides, quick time is generally made on the empty return run back to the city.

REGULAR PATRONAGE CREATED

It appears that with the most intelligent drivers a regular patronage has been created, and the same man is often found to have his own customers for whom he calls at appointed days or hours. In fact, the man more particularly mentioned above, claims that when he starts for his own account he will find sufficient patronage near his usual clients to make a satisfactory living and yet have considerable time left for work with occasional customers.

A majority of the vehicles now running in New York streets are of foreign make, mainly Darracq, Delahayes, Argylls, and Renaults. They generally are of the four-cylinder type with cylinders cast in one piece. They give very good service and in every case their owners are satisfied to continue ordering from the same makers. The bodies are generally made in the same country as the chassis, this being especially true of the French vehicles, as several large companies have been formed in France for the exclusive manufacture of taxicab bodies, of which Paris, London and Berlin need large supplies. The bodies on the Scotch Argyll cabs are made in Boston.

Of cabs of American build, the Thomas is used in considerable numbers. This is a special design very similar to the European product. Atlas cabs fitted with two cycle motors are numerous. The Sultan cab is also used quite extensively and there are many American Locomotive landaulets in public service. Both the last-named makes are extremely high grade; the builders of the Sultan cab have an extensive experience as the design originated abroad where this type is used in many cities. Several other makes are represented by a smaller number of units.

THE QUESTION OF HELP

More than the majority of truck and delivery van owners, the proprietors of taxicabs, have realized the importance of securing competent help. Their familiarity with the susceptibility of the horse, and their knowledge of the constant expert care required by the noble animal probably accounts for this. In any case they fully understood the need for experienced men, and in practically every instance, even when only four or five vehicles are run a competent foreman experienced in automobile work is employed.

The drivers themselves often are former professional chauffeurs and in this the taxicab owner is in a better situation than the truck owner. A competent man who has graduated from the antique junk automobile to the modern machine will generally be quite willing to take up the driving of what practically is a pleasure car, especially if he sees money in it, and probably would balk at the offer of driving a business wagon in which work he will be given much less independence and will occasionally have to perform the duties of a porter.

It should not be inferred, however, that professional chauffeurs are the rule amongst taxicabs. A great many of the latter are graduates from the numerous automobile schools and they acquire their driving experience in actual service.

HORSE CABBIES AS DRIVERS

A third class of drivers and one which many cab owners favor especially, is recruited among former horse cabbies. One company in particular employs them exclusively and trains them itself, the number of cabs used so far having been sufficiently small to permit of using only men who had long been known to the firm. When the twenty new cabs, the purchase of which is contemplated, are put in service, what steps will be taken are not known. These men, if at all intelligent, prove to be very desirable drivers, as they generally are familiar with traffic difficulties and have a long-gained experience of the cab-using public. It might incidentally be noted that in Paris the same view is held, and that the number of men giving up the whip for the throttle lever is greatly in excess of the number of drivers coming from other sources.

The cost of running taxicabs is less than the cost of maintaining horses, considering the service derived and the earnings.

Including tires, depreciation and all expenses, the cost of running an American-made four-cylinder cab is said to average $12 a day, leaving a margin of $10 to $15 gross profit on the earnings.

In a widely used make of French cabs the drivers figure their gasoline consumption to be approximately 6 gallons per 100 miles, including what is spent in keeping the engine running on short waits or for short intervals on long waits to avoid radiator trouble. Concerns paying their drivers fixed salaries, irrespective of work done, generally give from $2.50 to $3 per day.

From the foregoing it will be seen that the taxicab business which is but in its very earliest stage of development already, is a highly promising one. There should be a wide and profitable market for makers of suitable vehicles, although the problem of making a good taxicab is considerably more difficult than appears at first sight. Given a good vehicle, the opportunities for disposing of it are already numerous, and considering the number of wide-awake men engaged in the handling of the operative end of the business, the demand cannot but steadily increase for years to come.

ANOTHER BIG NEW YORK COMPANY

Several hundred motor cabs are to be placed in service in the streets of New York during the coming year, according to the plans of the American Taxameter Cab Co., which has established headquarters at 439 Fifth avenue, and is building a large new garage for their accommodation. Carford and Rockwell cabs are to be used. The latter are a new product built in Bristol, Conn., by a company headed by A. F. Rockwell, president of the New Departure Manufacturing Co., and president of the Bristol Engineering Co.

The composition of the American Taxameter Cab Co. is as follows: President, T. H. McInnerney, vice-president of the Duffy-McInnerney Co., of Rochester; vice-president and general manager, L. H. French, railroad and canal builder; treasurer, W. B. Hurlburt, president of the Carford Motor Car Co., of New York; secretary, C. R. Teaboldt, secretary-treasurer of the Garford Motor Car Co. Additional directors: Frank A. Merrall, vice-president of Acker, Merrall & Condit, of New York; F. D. Underwood, president of the Erie Railroad; E. M. Tierney, president of the Hotel Men's Association of the United States and Canada, and vice-president of the Hotel Marlborough, New York; George W. Sweeney, president of the Hotel Victoria Co., of New York, and the Lafayette Hotel Co., of Buffalo; A. F. Rockwell; James B. Coryell, president of the Cambria Coal Mining Co., of Philadelphia.

The American Taxameter Cab Co. is capitalized at $1,500,000, and the prospectus and announcements it has issued state that it already has contracts for a number of years with large hotels and railroad companies that will keep 200 cabs busy. The company is also negotiating with large department stores with a view to taking over their entire delivery service in addition to the regular passenger business of the hotels and railroads.

CAB DRIVERS' STRIKE SPREADS

The taxicab chauffeurs' strike against the New York Taxicab Co., which died out gradually during the month of November and has appeared to be without life during the past month, now threatens to be renewed and to become general. Drivers of horse cabs and hacks to the number of 2,500 or 3,000, who are members of the Liberty Dawn Association and the United Teamsters of America, have had grievances for a long time against the Livery Stable Keepers' Association, which embraces the largest liverymen in the city, and matters rapidly approached a climax toward the end of December. Strikes were called in the Moulton and Hall stables on December 19, and as many of the chauffeurs in the employ of the leading taxicab companies are affiliated with the hack drivers through the chauffeurs' union, it has been feared that more than half of all the hack and cab drivers in New York City would be on strike before the end of the year, completely tying up this form of passenger transportation.

The principal demands made by the hack drivers are regulation of their hours of work, recognition of the union and fixing of minimum wages. Many of the smaller stables and taxicab companies have signed agreements with their drivers acceding to the demands, but the members of the Livery Stable Keepers' Association have refused to concede the demands.

One of the leading strike breaking organizations of the country is quoted as saying that the strike will affect more than thirty livery stables and the New York Taxicab Co. and New York Transportation Co., which operate the red cabs and the green ones, but that the liverymen have signed a contract with the organization for the breaking of the strike and that 1,000 independent drivers are in readiness to take the places of the strikers. According to President Allen, of the New York Taxicab Co., there are still 250 men in its employ who took the places of strikers during the recent strike. President Meade, of the New York Transportation Co., said he did not think the unions would succeed in getting the drivers of the green cabs to strike. The strike, summer before last, of the drivers of its electric hansoms proved a failure, and it is not believed that they will want to repeat the experience. The men are paid wages according to hours of service instead of on a percentage basis, and the company pays all the expenses of operating and maintaining its vehicles.

ARGYLL CABS IN NEW YORK

Fifty Argyll taxicabs are now operating in New York City, most of them from the new Knickerbocker hotel, at Broadway and Forty-second street, and some stationed at the Hotel Buckingham. These are being operated by the Universal Taximeter Cab Company, with office and garage at 153-157 East Fifty-third street. The new service was started the second week in November. All of the new cabs plying from the Knickerbocker are distinguished by a large polished brass monogram HK (Hotel Knickerbocker) on the front of the radiator. The cabs are finished in black, with a broad green stripe on the body and cane effect in the door panel. Window frames are of mahogany.

All of the chassis were imported from Scotland, being the product of Argyll Motors, Ltd., of Alexandria. The bodies, however, were built in Boston from original designs by the Universal Taximeter Cab Company. The machines have a total weight of 2,350 pounds, and a turning radius of 25 feet.

The officers of the company are: J. H. Stack, president; John H. Naughton, treasurer, and John F. Mulgrew, secretary. Messrs. Mulgrew and Naughton are experienced livery men, having conducted the livery service for the Knickerbocker, Netherlands, Imperial and other high class hotels before the advent of motor cabs in New York. Last spring Mr. Naughton spent several months in England and on the Continent, studying the taximeter cab situation there and arranging for the purchase of the Argyll cabs.

In addition to operating the cabs, the Universal Taximeter Cab Company has secured the American agency for the Argyll cars and will have the sale of them in the United States. It also has the agency for the Richert taximeter instruments with which the Knickerbocker cabs are equipped, and will rent and sell these to other cab operating companies and individuals. This is a German instrument and is distinguished by the size of the fare indicating numerals, which are one inch high and are painted in white on a black background, so that they can be easily read at night.

The tariff of fares charged is as follows: First half mile or fraction, 50 cents; each quarter mile thereafter, 10 cents; each six minutes of waiting, 10 cents; each package or trunk carried outside, 20 cents. If the cab is dismissed north of One Hundred and Fifty-fifth street or outside of the Borough of Manhattan, return fare must be paid by the passenger at the rate of 40 cents per mile to the center of the city at Forty-second street and Broadway. These rates apply for from one to four passengers, and there is no extra charge for night service. Ferry and bridge tolls, however, must be paid by the passenger.

ARGYLL (SCOTCH) CABS USED BY KNICKERBOCKER HOTEL

Regular wages of $17.50 a week are paid the drivers of the cabs, and the company pays for the gasoline and cleaning, so that there should be little occasion for dissatisfaction on the part of the chauffeurs.

NEW LONDON COMPANY FLOATED

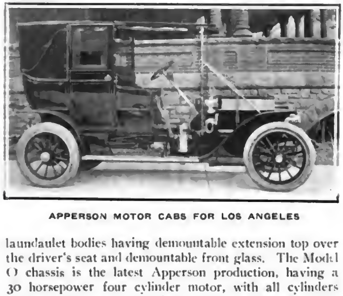
From a prospectus issued by a new London (Eng.) company called the Reliance Taxi-Cab Co., Ltd., it appears that the company has been incorporated with $1,000,000 capital stock and has contracted with the French manufacturers of the Porthos automobiles for the delivery of 500 four-cylinder 14-horsepower cabs at $1,500 each without tires. The first 60 are to be delivered within four months from order and 60 cabs each succeeding month. The contract provides a penalty for non-delivery as specified.

An interesting feature of the proposed business is the arrangements for garaging and up-keep, which relieves the operating company of any uncertainty regarding the cost of these items. A contract has been entered into with the Dunlop Garage & Maintenance Co., Ltd., by which that company, of which Harvey DuCros is chairman, agrees to undertake the maintenance and up-keep of the machines at the rate of 16s. 6d. ($4.12) per cab for each day of twelve hours that the cab is ready to ply for hire and guarantees that not less than 90 per cent. of the cabs shall always be available in good and efficient condition, and, further, to undertake to deliver the cabs to the operating company at the end of five years in good condition and running order to the satisfaction of the consulting engineers of the Reliance Taxi-Cab Co. This contract relieves the operating company from the expenditure of capital for the erection and equipment of a garage and from the difficulty of hiring chauffeurs.

Another novel arrangement is an agreement with the Norwich Union Life Insurance Society whereby that society will issue a redemption policy on the 500 cabs amounting to $750,000 in five years. So, that, at the end of that period, when the cabs are returned to the operating company by the Dunlop Garage & Maintenance Co. in good running condition, the original purchase price will also be paid to the operating company by the insurance society, enabling the company to replace its machines with an entirely new equipment for London service and send the old cabs into provincial places to continue in service.

APPERSON CABS IN LOS ANGELES

Several laundaulets were recently shipped by the Apperson Brothers Automobile Company, of Kokomo, Ind., to the H. O. Harrison Company, the Los Angeles, Cal., agent for Apperson cars, for taxicab service in that city. These cabs, as shown in the accompanying photograph, are the regular Model O chassis fitted with high grade laundaulet bodies having demountable extension top over the driver's seat and demountable front glass. The Model O chassis is the latest Apperson production, having a 30 horsepower four cylinder motor, with all cylinders cast separately and a double system of ignition with two independent sets of spark plugs. Axles are drop forged from vanadium steel, and the selective type change-speed gears are cut from Krupp chrome nickel steel. The materials and construction of other parts are in keeping. The machine has a wheelbase of 119 inches and a weight of approximately 2,400 pounds. There are interior seats for four passengers.



APPERSON MOTOR CABS FOR LOS ANGELES

TAXICAB NEWS IN BRIEF

The taxicab service of the New York Taxicab Company was extended to Brooklyn on December 1, when a station was established in front of the livery establishment of William W. Rudd, at 94 Putnam avenue, Brooklyn. A few of the red cabs that can be spared from the Manhattan service are sent over there each day and despatched from that stand upon receipt of telephone orders.

About 100 new Darracq cabs are now waiting in the Custom House to be taken out by the company, which will remove them as soon as additional space is finished off in its new garage in West Fifty-seventh street, Manhattan, for their accommodation. The company is now occupying this new garage in part, having vacated its temporary tent garage on Eighth avenue and Fifty-eighth street with the advent of winter. It still occupies the two temporary garages on West Sixtieth and West Sixty-first streets, which will be used until the leases expire.

The Atlanta Taxicab Company has been incorporated with a capitalization of $100,000, to operate a motor cab service with Sultan and Maxwell-Briscoe cabs in Atlanta, Ga. The machines were to be placed in the streets about the first of the year, and the rates of fare to be approximately the same as those charged in New York. An up-to-date garage for the accommodation of about thirty cars has been built for the company. Officers of the company are: F. J. Cooledge, president; L. P. Stephens, vice-president; R. F. Ingram, treasurer; Paul McMichael, secretary and general manager, and V. A. Batchelor, general counsel.

A private owner in New York City has received from the Franklin Manufacturing Co., of Syracuse, the first landaulet built in this country especially for the use of denatured alchol as fuel. The new vehicle is of 18 horsepower and is identical with the gasoline motor cabs of the 1909 Franklin model except for the provision made for the use of alcohol. The engine was especially designed for alcohol, alterations having been made as to compression and carburation, and this new fuel will be used in the machine. The engine was tested over hundreds of miles of road before shipment from the factory and the makers assert that it has demonstrated its capability of covering as great a distance per gallon of alcohol as other motors of like size do per gallon of gasoline.

A shipment of fourteen taximeter cabs was received about the middle of December by the New Orleans Taxicab Co., recently organized with $200,000 capital stock to operate an extensive motor cab service in the Crescent City. A garage has been leased in North Rampart street, between St. Louis and Conti streets. The enterprise has been promoted by a Mr. Woodward, who says that other deals which the company has under consideration have been held up temporarily by litigation. This first consignment of fourteen cabs is to be followed as quickly as possible by others until about 100 cabs have been delivered.

January 1 was the date set for the starting of a new motor cab service in Denver by a company organized and incorporated with officers as follows: F. A. Austin, president; E. W. Reynolds, vice-president; B. J. Reynolds, secretary-treasurer and manager. The first order was for five machines. The minimum charge is 50 cents, which pays for a ride of a mile or any part of a mile; thereafter the rate is 10 cents for each quarter mile and ten cents for each six minutes' waiting. The same rates apply whether the cab is hired for one or five passengers.

A Liverpool company operating taxicabs has devised a simple night signal to indicate when a machine is "for hire." This consists of a blue light which is displayed just above the flag on the taximeter when the cab is not engaged, and has greatly aided in increasing the number of fares at night.

The Commercial Vehicle

Vol. IV January 1909 No. 1

Published Monthly by The Commercial Vehicle, Incorporated, at 1402 Broadway, New York City

Cable Address
Comveh, New York

Long Distance Telephone,
425 38th Street, New York

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Subscription Rates

United States, Canada and Mexico . . . . One Year $2.00
Other Countries in Postal Union . . . . One Year $3.00

Notice to Advertisers

Changes in copy or in orders for advertisements for the month following must reach us not later than the 15th of the current month when proof is to be submitted, and not later than the 20th when no proof is required.

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Entered as second-class matter, September 13, 1906, at the post office, New York, N. Y., under the Act of Congress of March 3, 1879.

REGARDING TRADE LITERATURE

This is the time of year when there is much struggling with the writing and arrangement of catalogues, publicity matter, advertising copy and instruction books. It is a task that is little relished by the engineer, and usually falls upon the sales manager or the advertising manager. Too often it is side-stepped and delegated to a general advertising agency.

Really effective work in this field can be done only by one who has a thorough acquaintance with and appreciation of the transportation problems with which the merchant has to deal. The fact that a road race or a pleasure car tour was won by a car built by the same factory, or by a car equipped with the same make of mechanical lubricator, or carbureter, or lamps, or what not, is utterly irrelevant; it is as remote from what the merchant wants to know as the number of days a camel can travel in the desert without water.

The first thing required of the man who wants to sell commercial motor vehicles is to tell what work his vehicles will do and to tell it in a way that will carry conviction, whether he is speaking verbally or through the medium of type. He may be a mechanical or an electrical engineer, but in the great majority of cases he is addressing the business man who is at the head of a merchandising house and whose chief concern relates to matters having more direct bearing on his work than the form of motor suspension and number of cells in the battery of an electric machine, or the type of water pump and radiator used on a gas engine truck. He will want to know the load area of the platform or cubic capacity of the body, the daily mileage that the machine will make, day in and day out, the number of days in a month when it is likely to be out of service for any cause whatsoever, the average speed with load that can be maintained without damage, the cost of operation, cost of maintenance and up-keep and depreciation. He will want to know the over-all length, width and height of the vehicle, and the height of the platform from the ground, so as to be assured that it will pass through his doors and will be level with his shipping platform. He may want to know its weight to determine whether or not his scales will sustain the combined weight of the truck and its load, as in the case of a coal dealer. He will want to know how much will have to be paid to secure competent men to drive and care for it. Whether the vehicle will operate satisfactorily or not in snow and on sleet-covered streets; whether it can climb stiff grades with full load without damage, and travel rough and muddy roads; how it will be affected by heat and cold, are all matters of importance to him. He will be immensely interested, too, in knowing about its maneuvering capacity, which is one of the important advantages of the motor driven over the horse driven vehicle.

Obviously the compiler of a catalogue who is trying to reach and interest such a man—and he is the man who has the final word as to whether or not the purchase shall be made—is shooting wide of the mark when he spends time and money in making beautiful engravings and printing elaborate descriptions of gas engine valve mechanisms, crank shafts and cam shafts, differential gears, sliding gear transmissions and other mechanical details. A photograph or wash drawing of the truck itself may be very attractive and even seem indispensable, but it is safe to say that the picture would be more convincing if the truck were shown with a big load of goods aboard negotiating a bad street or steep grade. This is particularly true of display advertising, where there is little space for argument, description or the presentation of concrete examples of successful performance.

Quite likely the merchant will call in an engineer for consultation and advice before the purchase is decided upon definitely, but by the time matters have reached that point they have, in all probability, got beyond the catalogue stage, and the engineer will wish to make a personal inspection of the vehicle and perhaps observe it at work. It is well enough to print technical descriptions of construction to be sent upon request to prospective customers who ask for more information regarding mechanical details, but with the present relatively limited use of motor trucks and delivery wagons (as compared with horse drawn vehicles), the main effort should be applied in the direction of awakening the interest of the business man and merchant himself. Before he goes so far as to have the mechanical construction examined into, he must personally be reasonably convinced that motor traction is superior economically and "tactically" to his present method of trucking or delivery. And to convince any man, you must talk to him in the *language he understands.*

Another aid, which can usually be availed of by any concern that has become established in the field, is the publication of testimonial letters from present and responsible users of the particular make of vehicle described.

No doubt much more rapid headway would be made in the commercial vehicle industry if the sales-manager, salesmen and advertising managers who are trying to further the marketing of motor business wagons would study the trucking and delivery methods in present use so that they could look at the matter from the customer's viewpoint, instead of expecting and waiting for the prospective purchaser to spend his valuable time studying motor vehicle design and construction.

ROAD CONGRESS CONCLUSIONS.

At the International Good Roads Congress recently held in Paris, France, several interesting general conclusions were arrived at, besides a number of special technical decisions on road making which latter are of interest to the road builder rather than to the road user.

Summed up, the conclusions cover the following points:

The incorporation of tar and bituminous products in the road materials should be further developed as increasing the solidity of the roads and reducing their cost of upkeep.

River sand containing a large proportion of tiny pebbles is the only kind to be recommended as a binding material for paved roads which should lay on a concrete foundation at least four to six inches thick.

The planting of shade-giving trees is to be recommended as favorable to the preservation of all roads, especially in fairly dry climates.

A minimum of camber, sufficient, however, for drainage, minimizes the ill effects of wheel abrasion on the road surface.

Frequent passage of commercial vehicles with a rim width corresponding to less than 850 pounds load per inch is detrimental to well laid macadam roads.

The axle load compatible with normal road wear should never exceed four tons, except for speeds below eight miles per hour, when five tons are permissible.

Considering the movement taking place in favor of good roads in this country and foreseeing its beneficial influence on our industry, every possible help should be given to facilitate its ultimate success.

The carrying out of such simple advice as contained in the foregoing conclusions is a duty for all concerned, and the vehicle builder should, in his own interest, keep in mind the safe tire and axle load proportions which they mention.

In services necessitating the constant usage of a regular route by motor vehicles, such as is the case in passenger lines, mail transportation contracts, service between factories and stations, the success of the undertakings depends as much on the suitability of the roads as on the excellence of the machines. In such cases the builder should make use of all his influence to secure proper assistance from the people connected with the upkeep of the road, as only with their cooperation will he secure for his vehicles the favorable conditions which will allow them to show up to the best of their capabilities.

* * *

MOTOR AMBULANCE SERVICE.

Chicago's health department under Dr. W. A. Evans has been making a record for itself in comparison with other cities' departmental work in health lines. Incidentally, too, it may be said that the common sense Chicago commissioner has been making a demonstration of the practical uses of the commercial vehicle in ambulance service.

We have contended always that the commercial vehicle industry suffers much because of the man who, possessing a machine, continues to hold hard and fast by his ideas of the horse vehicle and its possibilities in service. Dr. Evans, with one machine assigned to his department, has broken away from all tradition as to the horse vehicle and has assigned his motor ambulance to a class of work which the horse vehicle cannot hope to do. To this end the one motor ambulance has been put to service for the isolation hospital for contagious diseases.

Chicago has approximately 200 square miles of territory from which these cases of contagion must be gathered. Discovery of a case of contagion, which by its nature is assigned to the isolated hospital, calls for prompt action on the part of the authorities. Also according to the sociological map of the city, such cases are quite likely to develop on the rims of the city, making a twenty-five-mile trip for the ambulance easily a matter of course. A short time ago it was necessary for the motor ambulance to make a single round trip of fifty-four miles in order that a smallpox patient from the far south side of the city be rounded up for isolation. With the motor vehicle this was a simple matter of a few hours, whereas with a horse vehicle the work, to be done in reasonable time with regard for the patient, would have required several changes of horses, if even it were not impossible.

Another and quite as important factor is the likelihood that immediately following such a run to a far south side of the city, another call may come on the heels of it from a far north side of the city. Manifestly the ambulance that carries smallpox patients is not desirable for removal of patients suffering from noncontagious diseases. Using the motor ambulance, however, the machine is ready for a second run the instant it has completed its first trip. Its capacity is measured only by the endurance of its driver and distance need not be considered.

This one machine in the Chicago department in the opinion of Dr. Evans has been doing a work which might have required a dozen horses, four wagons, four drivers and as many medical attendants to approach. But the machine has accomplished all this only because the head of the department has given it a chance to prove itself. He might have quartered the vehicle in the downtown district in connection with emergency service and holding it to the territory of the central district, have complained that after all it didn't accomplish any more than the old horse ambulance. Using the machine wisely, however, there is no likelihood that Chicago ever again will trust to a horse ambulance in isolation hospital service.

* * *

At this time of show activity in New York it will be interesting for our readers to know that the magnitude of the commercial vehicle industry in Europe is such that a separate show was considered necessary for its proper representation in Paris. This show is being held following the pleasure car show in the famous Grand Palais, with a setting almost as remarkable as that deemed proper for the latter. As usual we shall in later issues give complete reports of the outstanding features of European practice as evidenced by this annual function.

The daily press throughout the country has been giving a good deal of attention to the commercial motor vehicle of late. In a few cases special departments of commercial vehicle news have been established. The extensive employment of motor vehicles for newspaper distribution in the larger cities, and for the hauling of the huge rolls of print paper, are practical demonstrations that are having a good effect editorially.

MOTOR VEHICLE EXPRESS SERVICES IN BOSTON—II.*

C. F. MARDEN

CHARLES G. NEWCOMB of Newcomb's Newton express is comparatively a recent comer into the field of motor expressmen, though he has conducted a local express business for a long time. The middle of last June Mr. Newcomb purchased a 30 horsepower Stanley steam truck with a body capable of carrying a normal load of two tons, and he has run it constantly ever since, with the result that his business has shown a marked improvement and his customers are much better satisfied. Before he bought the Stanley truck Mr. Newcomb ran horses and wagons over the 7 miles between Newton Corners and Boston and they made two trips a day. The first wagon left Newton at 8 A.M. and the second and last at 11 A.M. No goods received in the afternoon could be delivered in Boston until the next morning. Returning from Boston one wagon reached Newton at 3 P.M. and the other at 7.30 P.M. With the steam truck he makes three round trips each day, the in-bound trips beginning at 8 A.M., 12 noon and 3 P.M. and the return trips ending at Newton at 11 A.M., 2.30 and 7 P.M. Thus he is able to deliver goods at almost any time of day, and while the improved service is a great boom to the customers it does not cost them any more.

With a normal load the Stanley truck makes the 7-mile run over the good roads between Boston and Newton in about thirty-five minutes. It does not do pick up or delivery work, except along its regular route or in the Boston Back Bay, all picking up and delivery at both terminals being accomplished with small horse-drawn teams. Under ordinary conditions only one man accompanies the truck, though if a heavy piece of freight is to be handled a helper is sent along. On one trip the truck runs down to the business center in State street, but on the other two it unloads in Park square. Mr. Newcomb states that the truck does the work of twelve horses, five men and five wagons, and though he has not kept an accurate account of comparative costs closely he estimates that the truck costs from $6 to $6.50 a day, while to do its work with horses would cost from $15 to $18 a day. He has had no experience with gasoline explosion motor trucks, but he is satisfied with the steamer, saying that it has all the speed and power that is needed. Weather makes little or no difference in the summer time, but as he has not had the truck through a cold season he cannot tell how it will act. He anticipates no trouble, however, during the winter months.

A somewhat different proposition is presented by Snyder's Walpole and East Walpole express. It is 22 miles between Walpole and Boston, too great a trip to be covered with horse-drawn wagons, and until recently the Snyder company has sent its goods back and forth on railroad trains. Freight collected in Boston by small teams during the day was shipped to Walpole and delivered the next morning. Thus Snyder's express gave only one delivery a day and that was on the day after the shipment of the goods from Boston. It cost from $8 to $15 a day for the railroad service and this was not by any means satisfactory.

Two months ago Snyder's express purchased a 3-ton Frayer-Miller truck equipped with 42-inch wheels and put it in service between Walpole and Boston. It was found that the truck could easily make two round trips of 44 miles each—a total of 88 miles—a day and it is now giving this service. This means that goods ordered by local storekeepers and private citizens from Boston are delivered in Walpole the same day, and there are two deliveries instead of one as formerly.

The roads between Boston and Walpole are excellent and with its large wheels the truck easily makes from 18 to 20 miles an hour. Firestone tires are used and they are giving excellent results. The truck makes its daily run of 88 miles on 7 gallons of gasoline and 2 quarts of lubricating oil and it is figured that the outside cost, including depreciation, figured at 20 per cent., and tire wear is not above $8 a day. The improved service very quickly showed a gain in the amount of business transacted.

ALDEN SAMPSON MOTOR TRUCK IN BOSTON-LYNN EXPRESS SERVICE

ALDEN SAMPSON MACHINES

In most instances motor trucks have been taken up by concerns which previously did business with horses; the Motor Transportation Company, however, started out primarily with motor vehicles and uses horses only temporarily as auxiliaries. This company started in business about two months ago and has three big 4-ton trucks built by the Alden Sampson Manufacturing Company of Pittsfield running between Boston and Lynn. From the company's Boston office at 259 Atlantic avenue to its

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* Continued from page 275, issue of December, 1908.

Lynn office on Summer street is a little more than 11 miles and the trucks make the trip in about an hour and eighteen minutes on the average. The picking up and delivery at both ends is done for the most part with horses and wagons, although the trucks pick up heavy freight. When the Alden Sampson Company brings out its new 1-ton trucks the Motor Transportation Company intends to use them for all its pick-up and delivery work.

On the first trip, which was made by the company September 23 of this year, the great truck carried a load of only 62 pounds composed of two tubs of butter; now two trucks are kept in commission all the time carrying nearly capacity loads and making three round trips daily between Boston and Lynn. And the company is able to get higher prices for its work than those received by the horse using express companies, merely on the strength of the quicker and more satisfactory service. On the present schedule one truck leaves Boston at 9 A.M. and 3.30 P.M., leaving Lynn on the return journeys at 12.30 P.M. and 6 P.M., concluding its day's work at about 7.30 o'clock in the evening. The other truck leaves Boston at 1.30 P.M., reaches Lynn at about 3 o'clock and arrives in Boston at 6 P.M. An hour and a half is allowed for the run, but the machines rarely take more than an hour and eighteen minutes. Over a part of the route where there is State road speed as high as 15 miles an hour can be maintained, but over about 6 3-4 miles the roads are rough cobbles and speeds of 7 or 8 miles an hour are the maximum. The third truck is kept for emergency work and for special jobs, but the regular trucks have given such reliable service that they have been laid off only a few days since the company began its service. One truck has run 2,100 miles, another 1,800 and the third 1,200. A little later the company intends to maintain a four round trip a day service between Boston and Lynn, competing against two expresses using the railroad and teams and four-horse express concerns, one of which has a Knox truck in use.

ATLANTIC AVENUE HEADQUARTERS.

The Alden Sampson trucks are huge affairs and when all three are in the company's depot on Atlantic avenue in Boston there isn't much room for anything else. Goods are handled from platforms at a height even with the floors of the trucks so there is very little lifting for the driver and his helper. The trucks are fitted with Continental engines of four cylinders each rated at 45 horsepower. The transmission has three forward speeds and reverse and is of the selective type. All gears are of chrome nickel steel, and Hess Bright bearings are used throughout except in the wheels where Timken rollers are used. The final drive is by double side chains enclosed in dust and mud proof cases. Single solid tires are used on the forward and double solid tires on the rear wheels. Two trucks are fitted with Diamond and the other with Firestone tires. The trucks average 56 miles a day and make that distance on nine gallons of gasoline.

From the start, according to R. Schaff, the manager, the business has been very satisfactory and there is apparently a great future ahead of motor transportation of freight and express matter. Mr. Schaff states that a little later the company hopes to extend its line to Salem, which is 18 miles from Boston, and it may establish other lines. The company is not bidding for the small package business, but is seeking the trade of factories and stores. A large part of its present custom is raw materials for the Lynn shoe factories taken from Boston to Lynn and the finished shoes returned to Boston. It also carries considerable machinery and goods for the dry goods and other houses of Lynn. The company has also found a very profitable business in transporting theatre scenery and properties, the big trucks being particularly adapted for such bulky freight, which must be transported quickly from place to place.

Mr. Schaff figures the cost of operating each truck at $15 a day, and this includes a charge of 25 per cent. depreciation, a charge for interest and the operating expenses. To do the work of one truck for a day would take seven two-horse teams each with a man and a wagon, and even with that equipment the service could not equal that given by the trucks. The actual operating expenses Mr. Schaff figures at less than $9 per day for each truck doing 56 miles a day. Gasoline costs 86 cents, three quarts of oil, 22 cents; other lubricants, 10 cents; labor (wages of driver and helper), $5, and tire deterioration, $2.75. Business up to the present time has been very satisfactory from the company's standpoint and it is constantly obtaining new customers.

(Concluded.)

F. S. BROADHURST, OF PHILADELPHIA, inventor of the "Broadhurst" spring wheel for motor trucks, which has given excellent satisfaction in England, is preparing to organize a company to manufacture and market the wheel in this country. In England these wheels have been tried out on the heaviest types of motor trucks, and while costing very little to maintain, have been the means of reducing upkeep expense in the trucks themselves.

WHAT IS BELIEVED TO BE THE LONGEST motor vehicle freight and passenger stage line on the continent is to be established between Oroville and Brewster in Okanogan county, Wash., connecting with a steamer line to Wenatchee. The line will have two 60-horsepower machines, which will carry twenty-seven passengers and ten tons of freight, making the run of eighty miles in eight hours. The trip by wagon now occupies almost two days. Branch lines will also be established to other points in the Okanogan country. The other line is between Marcus and Kettle Falls in Stevens county, north of Spokane, connecting with a steamer to Spokane Falls.

EXTENSIVE USE OF MOTOR VEHICLES was made by the commissariat department of the French army during the annual manoeuvers last year. Two army corps were provided with supplies by seventy machines, of which twenty belonged to the government and the others to commercial vehicle builders. There were three Renard trains in the outfit. The machines were grouped in convoys, each in charge of an officer who was provided with a fast automobile so that he could keep in personal touch with each machine in the line. The trucks were operated between the headquarters at Vierzon and regimental headquarters in the field, bulk being broken at the latter points where the final distribution of supplies was made by horsed vehicles. The privately owned machines were supplied with gasoline and oil granted an indemnity of 20 cents per horsepower for each day of service. Each driver also received an allowance of 20 cents per day. Practically all the French makers of importance were represented in the transport service.

OF INTEREST TO VEHICLE BUILDER AND BUYER

Several weeks ago the Grabowsky Power Wagon Co. entered the field in Detroit with a new motor delivery wagon and an entirely new idea in placing it before merchants. They not only sell the car, but guarantee to maintain it at a nominal charge, relieving the purchaser of all responsibility in the matter. The first Detroit merchants to accept this proposition is the grocery firm of Peter Smith & Sons, who are not wholly unacquainted with the use of motor wagons for delivery purposes, having tried out in a very thorough manner delivery of groceries by machines under the old methods. Regarding the new proposition of placing the burden of maintenance on the maker of the car, Henry Smith, of the firm, expressed himself as follows: "We have given this matter careful consideration, and in placing our order for these cars it means more than an experiment. If we did not believe in the maintenance service, we would not have placed the order, as our experience in the past has not been satisfactory; but by this plan, which is guaranteed, we cannot lose, and as we realize the great benefit of automobile delivery service, we are pleased to place the order for three of these cars." The Grabowsky Power Wagon Co. has done a large business to date, and is now making arrangements to move into larger quarters to accommodate the rapidly growing business. The building occupied at present will be remodeled and used for a maintenance station only.

The Singer Sewing Machine Co.'s offices in Detroit and Chicago are now operating Brush delivery wagons in connection with their sales department.

The Westinghouse Diary for 1909 is pocket size and bound in durable leather. It contains much information of interest to engineers and users of power apparatus, including among a variety of subjects treated discussion of Mercury Vapor Lamps, Meter Testing, Storage Batteries and Tungsten Lamps. It contains also useful maps of the United States, Panama, Cuba, Hawaii and the Philippine Islands, also a map of the world on Mercator's projection.

The ignition equipment of the gas motor railroad coaches built by the McKeen Motor Car Co., of Omaha, Neb., includes Connecticut coils, timers, and coil current indicators.

Mr. E. P. Chalfant has been elected general manager of the Association of Licensed Automobile Manufacturers.

An order for two sets of solid rubber tires to be used on Seagrave motor-driven fire combination wagons for the Vancouver, B. C., fire department has been placed with the Swinehart Clincher Tire and Rubber Co., of Akron, Ohio. These tires are guaranteed to give satisfactory service at a maximum speed of 35 miles an hour. As this fire department has had three sets of simliar tires in use on motor fire apparatus during the past year, it is manifest that the solid tires are satisfactory for the comparatively high speed required. It has often been contended that speeds in excess of 12 to 18 miles an hour cannot be maintained with solid tires; the present order is in apparent contradiction of this belief. The Swinehart company has made a special study of solid tires for high speed service during the past five years.

An extension of its present factory premises in Syracuse is planned by the Chase Motor Vehicle Co., with the intention of giving very greatly increased facilities for the production of motor trucks and wagons and motor rollers. W. H. Durphy, of Ithaca, N. Y., has removed his offices to Syracuse and has been elected secretary of the company. He was previously in charge of sales.

The latest issue of *The Studebaker*, the house organ issued by the Studebaker interests at South Bend, Ind., is largely devoted to an account of the dedicatory ceremonies held in the new Y. M. C. A. building at South Bend. This building stands as a memorial to the five Studebaker brothers who established the enormous vehicle works, of which the present Studebaker Automobile Co., building both pleasure cars and commercial vehicles, is a branch. The construction and equipment of the new association building cost about $250,000. Vice-President Fairbanks made the principal address at the ceremonies.

The Chicago representation of the reorganized Waverley Company, makers of electric wagons and trucks, has been taken up by the S. H. Peterson Automobile Company, which recently moved to 1229 Michigan Avenue, in the heart of the automobile district. Their former location was 2253 Cottage Grove Avenue. It is reported that the demand for four and six-passenger station wagons is exceptionally active.

The Willard Storage Battery Co., of Cleveland, Ohio, has opened an office in the Motor Mart, New York City, for the sale of batteries for electric vehicles and also storage batteries for the equipment of gas motor-driven trucks and wagons. Mr C. C. Bradford is manager of the New York office.

The importance of a good lubricant is of course very great in the operation of a racing automobile and we are informed that in the recent speed contests held in this country a large number of the entrants made use of Non-Fluid oils. The dripless consistency of these oils is obtained by condensing pure lubricating elements and not by a process of thickening with fats, waxes, rosin, talc or graphite, as in many of the greases on the market.

John B. Rowland, principal owner of the Publicity Press, an advertising agency transacting a large business in the motor vehicle field, died last month after being ill for several weeks of typhoid fever. Mr. Rowland is supposed to have become infected with the fatal germs by eating oysters at a dinner in a New York hotel, which was attended by a number of men connected with the motor vehicle industry. Since the dinner several others who were in attendance have been laid up with typhoid fever. Mr. Rowland was a man of very pleasant personality and extremely capable in his line of work. His untimely death is very sincerely regretted by a large circle of friends in the trade.

F. O. Sawyer, 3910 Olive Street, St. Louis, one of the oldest tire men of that city, has disposed of his entire business to the Firestone Tire & Rubber Co., and will devote his attention to outside interests. This new branch has been placed in charge of John P. Trader.

J. F. Singleton, who relinquished the advertising management of the Firestone Tire & Rubber Co., Akron, O., last spring, has returned to his duties after a prolonged tour of the Firestone branches and agencies extending from coast to coast.

The Knox Automobile Co. will be represented in the State of Rhode Island by the Hitchcock-Banks Motor Car Co., 179 Aborn Street, Providence, R. I.

A petition in bankruptcy was filed against the Commercial Motor Truck Co., of Plymouth, O., last month by the J. D. Fate Co. A. M. Trago, of Plymouth, was appointed receiver.

A very attractive lithograph in colores, showing a portarit of a girl with a sombrero hat, has been issued by the Ajax-Grieb Rubber Co., of Trenton, as an advertisement of its products. The lithograph is artistically mounted on heavy cardboard for wall decoration.

A test of the value of the motor vehicle as a means of transportation for a salesman was made in Western Canada lately by a representative of the Dyson Mfg. Co., of Winnipeg. He used a Buick light roadster. In two days he covered as much ground as would have taken four days to go over with horsed vehicles. The running expenses of the motor vehicle amounted to between $7 and $8; for the same service the hire of horsed vehicles would have amounted to $25. The test has been so satisfactory that the company is thinking of equipping all of its salesmen with motor vehicles.

The Commercial Vehicle

Vol. IV February 1909 No. 2

COMMERCIAL EXHIBITS AT THE NEW YORK SHOWS

Detailed Reports of the Complete Vehicles, Chassis and Component Parts and Accessories on Public View at the Motor Vehicle Shows held in the Grand Central Palace and Madison Square Garden in January

ALTHOUGH the motor vehicle shows held in New York last month were chiefly intended to exhibit the progress of pleasure car construction, they were fairly representative of the existing state of the art in the commercial vehicle industry. For obvious reasons, there were many absentees, so that the total exhibit of motor trucks and wagons should not be taken as a measure of the present magnitude of the industry. It was rather as well selected collections of samples of different models and methods of drive that the shows contained much of value to the intending purchaser. The manufacturer, the merchant, or the superintendent of delivery, each was afforded an opportunity to familiarize himself with the various types of machines, placed in immediate contrast, and to weigh comparatively the arguments of the several builders in favor of their particular treatment of the transportation problem.

Almost without exception the vehicles displayed were of standard types which had had service records warranting a continuation of their construction, and were displayed at the stands of builders who have already established themselves in the industry. In this particular there was a marked contrast to the usual conditions at purely pleasure car exhibitions at which, in the earlier history of the automobile industry more especially, there has always been a considerable percentage of new and untried models and even freak constructions. This is indeed the most healthy manifestation in the vigorous growth of the commercial vehicle industry. The responsible builder of the work vehicle realizes that he cannot expect the purchasing public to pay for conducting the experiments that must be carried out before a thoroughly practical type of motor truck or wagon can be produced. The romance of the roadside breakdown afforded material for interesting narrative in the development of the automobile, is supplanted in commercial vehicle operation by the stern necessity for reliability that can only be secured by prolonged and expensive trials under service conditions.

The first show to open its doors in New York was that conducted by the American Motor Car Manufacturers' Association at the Grand Central Palace, which continued from December 31 last to January 7. In this show the commercial vehicles were in their accustomed place in the gallery, and during the show week there was a large attendance at this section. On January 16 the Association of Licensed Automobile Manufacturers opened its annual exhibition in Madison Square Garden. A considerable portion of the basement was devoted to the commercial vehicles. As the Garden—as it is familiarly termed—is preeminently the show building of New York, the public attendance was even larger than at the previous exhibition, and there was a satisfactory record of business transacted when the show closed on January 23.

In the following pages will be found complete reports of the work vehicles exhibited at both the New York shows and also technical discussions of the various parts and equipment suitable either for commercial vehicle construction or operation. Tendencies in construction are noted and the complete machines analytically considered in an introductory chapter which treats of the exhibits in both shows as a whole. as the separation of the vehicles which two different shows occasioned was a purely arbitrary one without any technical significance. This is followed by separate discussions of each exhibit, arranged in alphabetical order for convenient reference. The chief characteristics of individual machines are also arranged in tabular form. Parts and accessories, suitable for commercial work, are grouped in separate classes and a complete survey of the tire situation closes the report.

TECHNICAL REVIEW OF COMPLETE VEHICLES

BROAD consideration of the constructional principles and tendencies exemplified in the commercial vehicle exhibits at the New York shows creates a pleasing impression of methodical and healthy development in the commercial vehicle industry. The constant and radical changing of models which characterized the growth of the pleasure car is conspicuously absent in the case of the work vehicle. It is evident that the manufacturer, having at the outset settled upon some broad principles of construction, has steadily preserved them, making every ounce of experience gained available for the betterment of his product as a whole

Before going into details of practice it will be proper to invite the reader to notice how the purpose of the commercial vehicle as a time saver and a money earner has constantly been kept in mind by constructors and how this care often shows in even the minutest details. The maximum efficiency of an utilitarian motor vehicle is only approached in proportion to the time during which the machine is on the road. Any laying up, no matter how brief, means a loss, and this has brought to the fore certain factors of reliability in operation and ease of repair in case of accidental damage which come up to a standard not so generally observable in the presently more extensive pleasure car construction.

EASE OF REPLACEMENT

It naturally follows that one of the outstanding features of the shows was the provision on numerous vehicles of easily dismounted and replaced mechanical units. Engines or gear boxes which could be removed without disturbance of any other part ever so little, and inside of very few minutes, were numerous in trucks and practically universal in taxicabs. The advantages of this are obvious, especially in the case of large enterprises where a few spare units can be kept available for the rapid returning to active service of accidentally damaged vehicles. This, of course, requires strict interchangeability of the parts concerned, and presupposes perfect manufacturing methods; at the same time, it is a very good point in favor of the vehicles in which it is found, as it leads one to believe that the care which was exercised in this particular respect was also devoted to the other points of the construction. An extreme instance of this design was to be found in the remarkable power plant of the Grabowsky vehicles. Considering the shows broadly, one was struck by the predominance ot relatively light weight and small capacity vehicles for goods transportation, the number of machines coming under the general appellation of "delivery wagons" with a capacity of less than two tons being considerably greater than that of any other type. A study of the economic conditions bringing this state of affairs would be beyond the scope of the present discussion; the fact, however, was interesting to mention in opposition to the situation in Europe, where the great majority of vehicles made are in the three to six ton class. A casual observer might be led to believe that this predominance of light weight vehicles was due to a desire to closely approximate pleasure car construction or even to use, as was too often done in the past, touring car parts in the making of business vehicles. Such a view, would, fortunately, be entirely erroneous to hold, and in practically every case there was found in the construction absolute evidence of the fact that the machines shown had been entirely designed with the strict purpose of producing exclusively commercial vehicles.

Coming to more particular points of construction, and taking first the largest vehicles in consideration, we shall study the main characteristics of the gasoline truck and wagon chassis shown, leaving the electrics and the taxicabs to be considered separately.

HONEYCOMB AND TUBULAR RADIATORS

In radiator construction it appears that the honeycomb

IN THE COMMERCIAL VEHICLE SECTION AT THE GRAND CENTRAL PALACE SHOW

GROUP OF GENERAL VEHICLE CO.'S ELECTRICS AT THE MADISON SQUARE GARDEN SHOW

and the tubular types share approximately equally the favor of designers. The tubular is generally admitted to be more resistant and easier to repair, but the greater efficiency of the honeycomb goes a long way to compensate for what weakness may not have been suppressed by more perfect manufacture. In some cases honeycomb radiators were fitted fully as strong as any tubular, but then their cost price was much greater, so that the simpler although slightly less efficient type is very often preferred, especially in cases where space is not strictly limited. It was interesting to note than in many cases special care had been taken to so mount the radiators that they would be protected from the ill effects of road shocks and frame distortions. The most noticeable instance of this was the well-known mounting of the Hewitt radiator on vertical slides, with an interposition of coil springs carrying the entire weight of the apparatus. In view of its position generally at the front end of the vehicle, the radiator is often exposed to accidental damage through collision; this was taken care of in several cases by the provision of a cross bar, well in front of it, as in the Gramm Logan, or as in the case of the American truck, by placing it some distance behind the front cross-member of the frame, which took the form of a heavy steel bumper.

Closely related to the position of the radiator is the location of the driver's seat. A high seat above the engine permits of placing the radiator at a higher level, but sometimes reduces somewhat the accessibility of the power plant. In a very few cases was the seat placed at a moderate height alongside the engine, the Hewitt truck being an example of this construction. In the great majority the seat, however, was above or behind the engine, both constructions seeming to be equally in favor, while in the case of the Manhattan trucks the choice was left to the customer. The location above the engine increases the useful space available for the load in a given size truck; it also affords a somewhat more commanding view of the road ahead of the driver. Its main drawback is that unless very carefully designed, it impairs the access to the engine, and by bringing the pedal and lever connections to the extreme front of the frame increases the complication around the power plant. It is likely, however, that it is the type which will eventually predominate when improvements in design will have removed the existing objections; the Knox 5-ton chassis in point.

CONSTRUCTION OF THE MOTOR

In engine construction it seems that wherever low initial cost is not a prime consideration the four-cylinder vertical reigns supreme. In all the other cases the double opposed motor is a favorite. In both types adjacent valves on the side of the cylinder are almost universal practice. Careful design and construction has made possible the use of horizontally operating cone-seated valves in the horizontal engines, thus simplifying considerably their striking mechanism. In the vertical engines the valves generally are of ample size, although it is one of the difficulties of the design with valves all on one side.

One of the main characteristics of the shows as regards motors was the universal adoption of the high tension magneto for ignition, generally as a standard fitment, but in any case always obtainable at a small advance in price. Its advantages in reliability and simplicity of control over the battery systems are enormous, especially having in mind the probably incompetent drivers employed on commercial vehicles. The old objection to an alleged difficulty in starting has entirely been overcome by the progress in design of both the carbureters and the magnetos themselves. In most cases where a high-tension magneto is employed it is found possible to suppress the spark advance lever, thus relieving the already busy driver of an important source of worry. The magneto is also especially interesting in commercial vehicles in that it entirely suppresses the troubles resulting from occasional and often entirely unexpected exhaustion of the current in storage or dry batteries. The make-and-break ignition system, although often considered as superior to the high-tension in efficiency, is going out of favor on account of the greater mechanical simplicity of the latter and of its lesser liability to loss of adjustment.

TWO CYCLE MOTORS

Two cycle and air-cooled engines are well holding their own, and no defections are to be noticed in the ranks of their acknowledged adepts. The two cycle engines shown on the Atlas and the Reliance chassis were especially attractive by their simplicity and absence of moving parts, and it is likely that as time goes the number of makers using such motors will have a tendency to increase, as they are especially well fitted for certain classes of work. The objection mostly brought against them is that their flexibility is not always equal to that of the four cycle engines, and that they are slightly less economical of fuel. It is just to state, however, that these disadvantages are compensated by their considerably reduced cost of upkeep due to the fewness of their moving parts, and also by their much more constant torque, which makes a two-cylinder two-cycle motor almost equivalent in every respect to a four-cylinder four-cycle motor of the same capacity. What few deficiencies there are in these motors are rapidly being overcome, and it is to be expected that the steady increase in their use will bring about improvements making them quite as efficient as the four-cycle type, at the same time preserving their existing important advantages.

In clutches the time-honored leather cone, which seems to be enjoying a revival in pleasure car construction, is not widely used in commercial vehicles. The preference of most makers goes to the metal clutch, especially of the disc type, and often provided with cork inserts. In connection with the latter it is to be noticed that their use is gradually increasing in both clutches and brakes, and that they appear to serve remarkably well when at all properly applied. They are extremely smooth in action, and one of their greatest advantages in commercial work is that they work equally well in oil and under conditions of neglect which would prove fatal for most other friction materials.

CHANGE SPEED GEARSETS

As regards change speed gears the planetary is well holding its own in the lightest as well as in the heaviest work. It gives equal satisfaction on the feather-weight Kiblinger wagon and on the ponderous Hewitt 5-ton truck. The main advantage of the planetary gear is its fool-proofness, at the same time one of its drawbacks is that it does not readily lend itself to more than two speeds forward, and if not remarkably well designed is likely to require periodical adjustment. Most of the vehicles shown were fitted with the standard type of sliding gears; the selective being much more in favor than the simpler progressive, an excellent example of the latter being found in the Reliance machines. The selective, although more costly to manufacture, materials being of equal quality, is easier to operate, and, being possessed of shorter and usually less flexible shafts, is more silent. The progressive has for compensation its greater simplicity, reducing the probability of derangement and expense of repair.

In a class by itself stands the Manhattan change speed gearset, in which the gears are always in mesh and free to revolve on their shafts. Tooth clutches are provided to establish the driving connection between any of the gears and the shafts, according to the requirements of the work. This construction does away with the possibility for a novice to spoil his gear wheels when changing speeds, and brings the brunt of the strain on the less fragile tooth clutches. The device as a whole can be considered as a compromise between the advantages and drawbacks of the planetary and the sliding gears. Its complexity would be the chief objection.

The most general practice in transmission bearings—in fact, in all bearings save for the engine—is to use the improved types of antifriction bearings of the roller or ball type. The roller is more generally used where the load is considerable and the speed low, or in the Timken type, where a combination of radial and end load has to be taken care of. These bearings have for most important advantage, ahead even of their friction reducing quality, their resistance to wear and their ease of replacement when worn. They also are considerably more economical than the plain type as regards lubrication.

CHAIN DRIVE THE FAVORITE

The most favored type of drive, always excepting taxicabs, is certainly the double side-chain drive. This construction is stronger and lighter than the live axle for heavy loads and has proven much more economical in tires. It also presents the advantage of facilitating the speed reduction between the engine and the road wheels. One of the main reproaches addressed to the chain drive has always been its liability to catch mud and moisture, which impair its efficiency to a certain extent and hasten its wear. Considering that such improvements as the Alden Sampson chain cases, or in a less complete form the Saurer chain brushes, are brought out to overcome this drawback, there is no reason why this otherwise excellent driving system should not be preferred. In the majority of cases the rear sprockets of the chain driven cars form most convenient drums for the application of internal expanding brakes, and in this respect it is well to mention that on the all important subject of brakes there appears to be an almost perfect unanimity of practice among all the manufacturers.

The internal expanding brake operated by means of the side brake lever is practically universal on all types of vehicles, including electrics and taxicabs. In very few instances are contracting brakes used in this location. The overwhelming advantage of the internal brake is its dirt and mud proofness, most valuable in such an exposed location as the wheel, and its better adjustment preserving quality. The second or service brake seldom exists in electric vehicles or in gasoline trucks fitted with planetary change speed gearsets; in both of these cases the necessary retardating action is obtained by use of the reverse gear. In most trucks fitted with sliding change speed gearsets, and in a few cases of planetary, the service brake consists of a contracting band brake located on the countershaft and operated by the right-foot pedal. In a few instances this brake is of the expanding type, but the contracting type is in much greater use.

A most accessible location of the service brake is found on the Rapid, Reliance and American trucks; it consists in operating this brake on drums located outside of the frame close to the driving sprockets. In this case equalizers are provided.

STEEL WHEELS GAINING GROUND

Passing naturally from the brake to the wheel, the wood wheel, which appears to be a reflection of pleasure car convention rather than a necessity of heavy vehicle construction, is still well in the lead. A strong sign of the times is, however, found in the fact that the majority of makers are prepared to supply "indestructible" steel wheels at an option, while the Grabowsky wagons are fitted with them as standard equipment. There is no doubt that in places of varying climate the steel wheel is inmeasurably better adapted than the wooden construction. It is impervious to temperature or hygrometric changes, and there is no need for occasional resetting or tightening.

As regards wheel bearings, it is fortunate to be able to state that the plain bearing is entirely out of existence, and that roller or ball bearings are universally used, with a predominance of the former. In many cases these bearings have been fitted even in the steering knuckle joints. This is a commendable practice, as this certainly is one of the most strained parts in a heavy truck. Axles are usually made of amply proportioned steel forgings, often of special chemical composition, and both tubular and cast steel axles are the exception.

Steel tires were prominent by their absence, except on the Lansden electric dock truck, which is an absolutely special vehicle. In Europe, where rubber is much more expensive than in this country, the subject of steel tires for freight transportation has received no small amount of attention. The more general practice on the trucks shown in New York is to employ a single solid tire for the front wheels and a dual tire for the rear. In only one instance—the Hewitt 5-ton truck—was a dual construction (block type) used for the front wheels. Few although important instances of individual block tires were shown. It nevertheless is reasonable to believe that in view of its economical advantages this type of tire will rapidly gain ground.

Concerning spring suspensions, the semi-elliptic in front and the platform type in rear are favorites for the heavier class, while in the light-weight class quite a few instances of full elliptic construction are to be found, noticeable among which is the Franklin, fitted with coil spring shock absorbers. The subject of springing is receiving considerable attention, and the provision of supplementary springs to take care of increasing loads is a tendency which can only be encouraged. The most notable instances were the Rapid, in which a semi-elliptic transverse spring is provided which comes to bear on the rear axle when the ordinary springs have reached a certain amount of deflection, and the Alden Sampson, in which coil springs are provided at the rear end of the rear springs to carry the weight of the truck body when empty, and which, when closed entirely by the application of the load, bring into action the main springs themselves.

A TENDENCY IN SPRING CONSTRUCTION

A widespread tendency in spring construction is the provision of slides instead of shackles at the point where the springs are attached to the frame. This construction is possessed of important advantages besides its generally lesser original cost. It avoids weakening the spring leaf by the forging of the bolt eye at the end; it locates the wear on easily replaced surfaces instead of putting it on bolts of difficult lubrication, and gives freer spring action by avoiding the tendency which a shackle has to counteract the raising or lowering of the frame by its oscillating motion.

In frame construction, rolled channel or angle steel is the most commonly used material, armored wood being found only in the lighter class, while the sole instance of pressed steel is in the heavy Hewitt trucks.

Electric Commercial Vehicles

These have shown very few changes over the accepted practice of the previous years. It is pertinent to mention, however, that the latest developments in this field have been mostly along the line of very large four-wheel drive trucks and of "mixed" gasoline-electric systems. None of these was exhibited. An interesting construction was shown on the smaller sizes of the Commercial Truck Company of America's exhibit, in which the motor was built in a rigid unit with the rear live axle, which it drove through a worm gear arrangement. What remarks were made in connection with gasoline trucks on the subject of chain drives, axles and bearings, brakes and running gear in general apply equally well to the electric vehicles.

Taxicabs; Domestic and Foreign

Although a relatively new type of vehicle, the taxicab, mainly evolved from an adaptation of the pleasure car, is already built on standardized lines, and its construction shows remarkable accord between the different makers on the general principles of design.

Four vertical cylinders and high-tension magneto ignition is the more general rule of power plant construction in the American made taxicabs; these also generally are of higher power than the imported machines of the same class, this fact being mostly due to the necessity abroad of reducing the fuel consumption to the minimum on account of the high cost of gasoline. When four cylinders are used the unit casting construction generally is preferred, and the Bristol and the Cleveland cabs are excellent models of the type. This construction considerably reduces the complication around the engine and suppresses a large amount of otherwise unavoidable piping. The seat of the driver uniformly is located behind the engine, and a favorite construction consists in placing it on the left side of the frame, without letting it extend the whole width of the car, thus providing a convenient space for the carrying of trunks or baggage. This construction was especially noticeable on the De Dion and Bristol taxicabs.

THE LEFT-HAND DRIVE

The main advantage claimed for the left-hand drive is that with the prevailing rules of traffic the driver is better enabled to see the road ahead of the vehicles which he is about to pass. This, however, is to some extent offset by the necessity of operating the control levers with the left hand unless they are located in the center of the frame, where they occupy a rather large space, and are likely to be interfered with by the possible shifting of the baggage carried. The left-hand location of the seat will also mean the impossibility for the driver to open the door of the landaulet for the convenience of his patrons without stepping out. This will either cause a loss of time or the disappearance of a commendable custom. The Sultan cab showed adherence to the right-hand drive.

Returning to mechanical construction, the transmission generally is of the selective, three-speed type, giving a direct drive on the higher gear with propeller shaft drive. There is no example of chain drive. Ball bearings are used almost exclusively in every point except the engine. The suspension uniformly is by semi-elliptic springs in front and three-quarter elliptics in the rear.

A noticeable exhibit was the single-cylinder 9-horsepower De Dion cab, which exemplifies a type coming into considerable pre-eminence abroad, where cheapness of service is a prime consideration.

In almost every case was the frame of the drop type, embodying a very low general level, with a raise above the rear axle to clear the differential casing; this construction facilitates the establishment of a body of comfortable access and increases the stability.

VEHICLES EXHIBITED AT GRAND CENTRAL PALACE

Atlas Motor Car Co., Springfield, Mass.

ONE GASOLINE LIGHT DELIVERY WAGON.

This vehicle was exhibited together with the pleasure cars of the same make. It has for its most important characteristic the employment of a two-cylinder two-cycle vertical motor. The construction is very simple and sturdy. Like all two-cycle machines this vehicle shows a remarkable absence of visible moving parts.

American Motor Truck Co., Lockport, N. Y.

ONE 3-TON GASOLINE TRUCK CHASSIS.
ONE 1-TON GASOLINE DELIVERY CAR.

One feature of these vehicles is the provision of planetary change speed gears on the larger models and of sliding gears on the smaller ones.

The engines are of the company's own design and are possessed of seldom found commendable features. They are fitted with a substantial centrifugal governor limiting their speed to reasonable limits and most accessibly located on the timer shaft. The use of this device is perfectly justified on a truck where it reduces the wear and tear on the motor, and this point is one in which the makers of commercial vehicles should rightly diverge from pleasure car practice. The construction in general is substantial and evidences a constant effort toward the production of long-lived mechanisms.

Bristol Engineering Corporation, Bristol, Conn.

ONE GASOLINE TAXICAB CHASSIS.
ONE COMPLETE GASOLINE TAXICAB.

The chassis exhibited on this stand gives evidence of capable and up-to-date design. The engine has four vertical cylinders in a single casting provided with large inspection openings. The rest of the machine follows standard practice but appears to be very liberally proportioned. Ball bearings are used throughout save for the motor which runs on plain bearings. The driver's seat is on the left side with the operating levers on the right, directly attached to the gear box. The machine can turn in a 50-foot street. Quick detachment of the different units has been aimed at; it is claimed that the engine can be removed in 20 minutes and the transmission case in 10 minutes.

An unusual feature is the provision of an unobtrusive steel guard plate in front of the radiator.

Brush Runabout Co., Detroit, Mich.

ONE 500-POUND GASOLINE PACKAGE CART.

This vehicle is of a very light and simple, almost rudimentary, construction. It is designed for light work especially when first cost is a prime consideration.

The features of it have been well tried and although unusual have proved satisfactory.

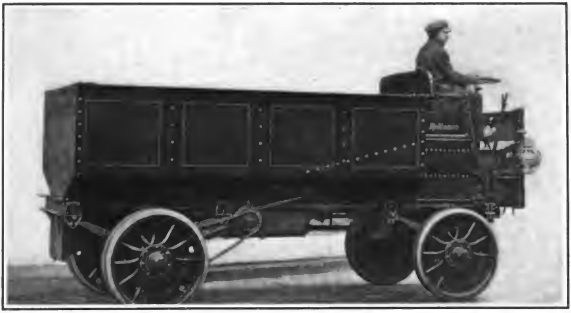
The main characteristics are the single cylinder engine, the peculiar change speed gear, the use of wooden axles and the employment of coil springs combined with special shock absorbers for the suspension.

Cleveland Auto Cab Co., Cleveland, O.

ONE FOUR-CYLINDER GASOLINE TAXICAB.

The handsome cab exhibited by this newly formed concern is fitted on a new chassis designed by the well known engineer, S. P. Mooers. The engine has four cylinders cast in pairs and develops 20 horsepower. The power is transmitted to the rear wheels through a selective three speed and reverse gear and a propeller shaft to the live axle. The driver's seat is located on the left

FIRST APPEARANCE OF THE GRABOWSKY GAS MOTOR VEHICLES AT A NATIONAL SHOW



RELIANCE STEEL BODY COAL TRUCK EXHIBITED OUTSIDE THE GRAND CENTRAL PALACE SHOW

side of the frame; behind the hood, the controlling levers stand in the center of the floor board and are operated by the right hand.

Commercial Truck Co. of America, Philadelphia, Pa.

ONE 1,000-POUND ELECTRIC TRUCK CHASSIS.
ONE 2,000-POUND ELECTRIC CLOSED PANEL DELIVERY WAGON.

These vehicles are fitted with a single motor, driving to the live rear axle by means of a short shaft and a worm and screw gear.

The entire driving mechanism is completely enclosed, including the motor, in a cast steel casing, doing away entirely with universal joints or chain drives.

The four wheel driven trucks of the same make were not represented at the show.

De Dion Bouton American Branch, New York.

ONE SINGLE CYLINDER GASOLINE TAXICAB.
ONE FOUR CYLINDER GASOLINE TAXICAB.

These exhibits are of a type extensively used in Paris and other important European cities. The single cylinder machine is most noticeable in view of the fact that its economy of running is extreme. In fact a company operating it in Paris on a very large scale only charges the same prices as the old horse cabs and still finds the business perfectly profitable. The charge is 40 cents per hour, or 30 cents for any unbroken journey within the walls of Paris.

The bodies accommodate three people comfortably and are internally fitted with sanitary washable upholstery.

Grabowsky Power Wagon Co., Detroit, Mich.

ONE 2-TON, SOLID FRONT PANEL GASOLINE TRUCK.
ONE 1-TON GASOLINE CHASSIS.
ONE 1-TON 12 PASSENGER GASOLINE CAR.
ONE 1-TON SCREEN BODY GASOLINE DELIVERY CAR.

These vehicles made in three different sizes, namely 1, 1 1-2 and 2 tons, are all fitted with the same model of quick detachable power plant. The engine is double opposed and the transmission planetary.

The Grabowsky machines are designed with a special view to accessibility and ease of repairing. The entire power plant including the transmission can be removed in a very short time by the disconnection of six quick detachable couplings and the undoing of two bolts. This permits of sliding forward the subframe with the engine, the gear mechanism and their accessories as a unit; a portable folding tray embodied in their design supports them while any work which they may require is performed. The bodies are also designed and fastened on the chassis in such a way that their removal and change from one type to another can be very rapidly performed by a single man.

The Gramm-Logan Motor Car Co., Bowling Green, O.

3-TON WATER-COOLED CHASSIS.
1,500 POUNDS DELIVERY CAR AIR-COOLED CHASSIS.

This concern makes one water-cooled and two air-cooled models.

In each case the engines are vertical four-cylinder. The water-cooled motor is of Continental make and the air-cooled motors are Carrico.

Points of design which are of interest are the provision of slides instead of shackles at the rear end of the front springs, and the incorporation of a sand box suspended from the frame behind the countershaft. This box feeds sand intermittently to the rear wheels to give them adherence on slippery ground by the operation of a small pedal.

The large size of the axles is strikingly liberal considering the nominal capacity of these machines.

Hart Kraft Motor Co., York, Pa.

THREE 1,000-POUND GASOLINE DELIVERY WAGONS.

These vehicles, all of the same completely enclosed type, only differed in their outside finish.

One of the main characteristics of the Hart Kraft product is its high clearance, making it especially suitable for rough service under any condition of road surface.

The entire mechanism, including the transmission, the jackshaft and the double chain drive sprockets, is mounted on an angle steel subframe attached to the main frame at three points by means of five bolts. All the springs are full elliptics, to secure greater ease of riding under rough conditions.

W. H. Kiblinger Co., Auburn, Ind.

ONE KIBLINGER GASOLINE DELIVERY CAR.

This vehicle consists in the adaptation of a light delivery body to the chassis of the Kiblinger high wheel buggy.

The machine is very light and is propelled by a double opposed air-cooled motor.

It would find an extensive field of usefulness in light delivery or mail carrying services in thinly populated outlying districts where the distances are relatively long in proportion to the amount of business transacted.

Lansden Co., Newark, N. J.

ONE ELECTRIC PANEL WAGON.
ONE 4,000-POUND ELECTRIC PLATFORM TRUCK.
ONE ELECTRIC OPEN DELIVERY WAGON.
ONE 4,000-POUND ELECTRIC DOCK TRUCK.

These vehicles are all driven by a single electric motor with a final drive through side chains. In every case a first reduction in speed is provided by a single chain driving from the motor shaft to the chain sprockets' jackshaft.

The dock truck was a very interesting exhibit. It followed the same lines as the other vehicles of the same make as far as the driving mechanism was concerned, except that the body was naturally much nearer the ground and had its driving axle in the center with the steering wheels placed fore and aft of the latter. It was the only case of coil spring suspension in the line of heavy vehicles exhibited at the show.

Mack Brothers, Allentown, Pa.

ONE 5-TON GASOLINE TRUCK CHASSIS.
ONE 16-PASSENGER GASOLINE BUS.

These vehicles are sold under the name of "Manhattan." One of their salient features is the construction of the gearset. There is no sliding motion of the gears, which are constantly in mesh. Individual clutches are provided for the transmission of the driving power through any of the gears according to the requirements of the road or of the load carried. To secure silence on the high gear the clutches are so arranged that on the direct drive all the gears are stationary.

Maxwell-Briscoe Motor Co., Tarrytown, N. Y.

1,000 POUND DELIVERY WAGON.

This exhibit is a 20-horsepower, double-opposed chassis fitted with a fully enclosed delivery body of attractive design.

By reason of its light weight and of its designation as a rapid carrier of bulky but light goods this machine is fitted with pneumatic tires. It is capable of a 25 miles per hour speed, and requires but one man to drive it and attend to deliveries. The makers claim it to be capable of a service equal to that of five to eight horse-drawn vans of similar capacity at an operating cost about equal to that of one of these vans alone.

Pittsburg Motor Vehicle Co., Pittsburg, Pa.

ONE 1,000-POUND ELECTRIC DELIVERY WAGON.
ONE 2,000-POUND ELECTRIC DELIVERY WAGON.

The two models shown by this concern at the Palace Show were representative of the two smaller sizes of a line of electric chassis consisting, besides, of a 3,000 and a 6,000-pound chassis.

These machines are of the standard double side chain driven type. The motors are located between the rear axle and the battery box. There are two motors, each driving one wheel independently of the other, in all the models save the 1,000-pound vehicle which carries only one motor.

Rapid Motor Vehicle Co., Pontiac, Mich.

ONE 5-TON GASOLINE TRUCK CHASSIS.
ONE 2-TON GASOLINE TRUCK CHASSIS.
ONE COMBINATION FIRE WAGON (2 TON).
ONE HOSPITAL AMBULANCE (1 TON).
ONE 12-PASSENGER PULLMAN GASOLINE CAR (1 TON).
ONE 20-PASSENGER "TOURIST" (2 TON).
ONE 1-TON GASOLINE DELIVERY CAR.
ONE 2-TON GASOLINE DELIVERY CAR.
THE GLIDDEN TOUR TIRE AND SUPPLY TRUCK.

Save for the 5-ton chassis all the vehicles exhibited on this stand are fitted with double opposed horizontal engines. The fire engine was the only vehicle of this type in the Palace Show and is a standard model of the Rapid line. It is fitted with hose reels and two chemical tanks and carries an extension ladder. It should prove of interest for small communities or for first aid in more important cities.

The passenger cars are of the open sight-seeing type. The difference between the two resides more especially in the elaborateness of the bodies and fittings.

The delivery cars were of the well known standard Rapid type.

The ambulance bore considerable resemblance to the delivery cars save for more comfortable springing, special finish, in keeping with its particular class of work, and the provision of special medical appurtenances and storage room and lockers.

Reliance Motor Truck Co., Owosso, Mich.

ONE 3-TON GASOLINE CHASSIS.
ONE 3-TON GASOLINE TRUCK COMPLETE.
ONE 2-TON GASOLINE TRUCK COMPLETE.

Besides the foregoing exhibits the Reliance company had in operation on the streets adjoining Grand Central Palace a 3-ton coal wagon which attracted considerable attention.

One of the main features of the Reliance vehicles is the employment of a two-cycle engine. The total absence of external moving parts in this type of motor makes the Reliance vehicles conspicuous for their simplicity and their ease of upkeep. This important feature of simplicity is also preserved in the general design of the transmission and driving mechanisms, the entire chassis being remarkably free of complications of any sort. The Reliance motors are built, according to the power required, of two-, three- or four-cylinder casting units; a single type of unit has been adopted—it consists in an individual cylinder casting, water jacketed of 5 1-8 inches bore and 5 inches stroke. It will be remembered that two cylinders working on the two-cycle principle are equivalent in smoothness of running to four cylinders working on the usual four-cycle principle, and that similarly a three or a four-cylinder engine of the Reliance type is equivalent to a six- or an eight-cylinder four-cycle engine.

Saurer Trucks, Arbon, Switzerland.

ONE 4-TON GASOLINE TRUCK CHASSIS.

This vehicle, of Swiss manufacture and very extensively used in Europe, was exhibited on the top floor of the Palace by the New York representatives.

It was of more than passing interest, being generally acknowledged to be one of the vehicles most representative of the best European practice.

One of its distinguishing features is the provision of a special compressed air mechanism for automatic starting of the engine and for use of the latter as a brake, making the use of friction brakes exceptional. This device was described in detail in connection with our report of last year's Paris show and has since been adopted under license by a large number of European makers.

Sultan Motor Co., Springfield, Mass.

ONE FOUR-CYLINDER GASOLINE TAXICAB.

This vehicle follows the standard lines of generally accepted practice. It is an exact duplicate of the numerous vehicles of the same make plying in the streets of many American cities.

One of its main claims to attention is that it is a foreign product imported knocked-down from the other side, and assembled in Springfield. A large number of cabs of this make are in successful use in Paris.

The design is conservative yet perfectly up-to-date. All parts are easily accessible and great stress is laid on the quality of the materials employed in its making.

VEHICLES EXHIBITED AT MADISON SQUARE GARDEN

The Autocar Co., Ardmore, Pa.

TWO "UTILITY GAS MOTOR CHASSIS."
TWO UTILITY GASOLINE DELIVERY TRUCKS.

The Utility chassis is driven by means of a double-opposed horizontal motor, located under the driver's seat, through a three-speed progressive change speed gear and a live rear axle.

This machine was designed with the object in view of producing a vehicle capable of the widest variety of applications. The ordinary types supplied are taxicab, stake or panel truck, closed delivery wagon, hotel bus, wagonnette, etc. The only change necessary to exactly adapt the utility chassis to these various services is an alteration in the wheel base to accommodate the different frame lengths required by the bodies used.

Champion Wagon Co., Owego, N. Y.

ONE 1,000-POUND ELECTRIC DELIVERY WAGON.

This vehicle was of the electric single-motor, chain-driven type and was fitted with antifriction bearings throughout. One important Champion exhibit, which through lack of space was left in a storage room of the Garden, was a station baggage truck of an improved type. This truck has its two axles mounted under large fifth wheels. One motor is fitted at each axle and drives its corresponding pair of wheels through a differential. Brakes are fitted to all wheels. A platform is provided at each end of the truck as well as two levers which together with the platform fold out of the way when not in use. The operator stands on the platform at the rear of the vehicle and operates the brakes and the steering through the levers. The four-wheel drive and steer construction of this vehicle make it specially suitable for use on congested platforms and piers in making its turning radius unusually small.

H. H. Franklin Mfg. Co., Syracuse, N. Y.

ONE 1,000-POUND CLOSED GASOLINE DELIVERY WAGON.
ONE 2-TON GASOLINE STAKE TRUCK.
ONE AIR-COOLED TAXICAB COMPLETE.

All the vehicles shown by the Franklin Mfg. Co. are fitted with the well-known air-cooled Franklin gasoline engine. The valves are concentric and located in the top of the cylinder head, greatly facilitating cooling by reason of the large openings provided for the passage of gases.

The taxicab is mounted on full elliptic springs with Sager supplementary coil springs to increase the ease of riding and avoid excessive oscillations. The frame is wooden, a construction which has long been a feature of the Franklin product.

All the Franklin commercial vehicles are driven by means of a worm gear live axle.

General Vehicle Co., Long Island City, N. Y.

ONE 7,000-POUND ELECTRIC TRUCK.
ONE 4,000-POUND ELECTRIC TRUCK.
ONE 2,000-POUND ELECTRIC CLOSED WAGON.
ONE 1,000-POUND ELECTRIC CLOSED WAGON.
ONE 350-POUND ELECTRIC CLOSED WAGON.

The General Vehicle Co. exhibited a very complete line of electric vehicles as enumerated in the foregoing list.

These vehicles, although built as light as possible, vary well, withstand the rough usage on docks and in freight yards, for which service a great many are at present in use in the larger sizes.

The lighter sizes are specially intended for dry goods and city delivery service.

They are preferably supplied as complete vehicles fitted with bodies of standard General Vehicle design.

The chassis of these vehicles are all built on uniform

STUDEBAKER ELECTRIC VEHICLES ON VIEW IN THE MADISON SQUARE GARDEN BASEMENT

lines, consisting essentially in a single motor located between a jackshaft and the rear axle. The motor drives a differential gear on the jackshaft through a silent chain, and sprockets at each end of the jackshaft drive the rear wheels through the usual type of roller chain. The battery comprises forty-four cells and supplies the current to the motor under a tension of eighty-five volts.

Hewitt Motor Co., New York City.

ONE 5-TON GASOLINE TRUCK CHASSIS.
ONE 2-TON GASOLINE TRUCK CHASSIS.

The Hewitt Motor Co. can well claim to have the largest gas motor vehicles made in this country, as besides the two models named in the foregoing list they had on view on the streets adjoining Madison square a 10-ton capacity coal wagon. All the Hewitt vehicles are fitted with Kelly Springfield individual block tires, and the builders claim that it is only by reason of the use of this type of tires that they find the handling of such large loads possible.

The 10-ton truck possesses the same mechanical characteristics as the 5-ton model, except that it is geared for a considerably lower speed. The Hewitt trucks were the only very heavy vehicles at the two shows fitted with pressed steel frames. One of their features is the use of planetary gearing giving two speeds and reverse.

Knox Automobile Co., Springfield, Mass.

ONE 5-TON GASOLINE FIRE WAGON.
ONE 2 1-2-TON GAS MOTOR CHEMICAL WAGON.
ONE 1 1-2-TON GASOLINE TRUCK.

As evidence of the large possibilities which are opened to the commercial vehicle in the fire-engine field the Knox company exhibited two vehicles of this type taken from actual service for show purposes.

The Knox vehicles are made optionally in air or water-cooled types. The air-cooled engine cylinders are of the well-known Knox "porcupine" pattern. In all the Knox engines the valves are seated directly in the head without the interposition of separate valve cages, thus insuring perfect cooling of these important parts.

Reading Standard Co., Reading, Pa.

ONE R-S DELIVERY SERVICE GASOLINE MOTOR TRI-CAR.

This is a very improved type of tri-car specifically built to meet the severe requirements of delivery service. Although the machine shown was fitted with a single-cylinder engine, it is also supplied with twin-cylinder motors. Four different sizes of engines can be selected from to insure satisfactory service considering the requirements to be met. The R-S delivery tri-car is fitted with a clutch and planetary two-speed gear, magneto ignition, hand-crank starting and foot brake. It virtually possesses all the features of a light car with further advantages in light weight and ease of handling.

Alden-Sampson Mfg. Co., Pittsfield, Mass.

ONE 4-TON SAMPSON GASOLINE STAKE TRUCK.

The gas motor truck chassis shown by the Alden-Sampson Mfg. Co. embodies all the latest improvements in truck design and construction and is a most practical vehicle. One of its unique features is the provision of oil-tight chain cases completely enclosing the driving chains and increasing considerably their life and efficiency by the protection which they afford against all destructive elements such as mud, dust and moisture. Another feature is the provision of a convenient handle on one side of the truck by which a suitable locking device can be brought into action in the differential gear. To secure a rigid drive for both wheels in case of an emergency such as can be caused by the slipping of one wheel in snow or in a mud hole, or to provide a convenient means of returning home without road side repair in case of a chain breakage.

The perfect accessibility of every part is a point which has prominently been kept in view in the design of the Sampson truck. One reproach often addressed to the motor-under-the-seat construction in commercial vehicles is that it tends to render the access of the mechanism rather difficult. In the Sampson truck the seat is so mounted that by the undoing of a few bolts it can entirely be slung out of the way.

In order to preserve the radiator from the ill effects of road shocks and chassis frame distortions on rough ground this important component is flexibly mounted. The method employed also allows its ready removal in very few minutes and without the disturbance of any other part.

Studebaker Automobile Co., South Bend, Ind.

ONE 800-POUND ELECTRIC AMBULANCE.
ONE 800-POUND ELECTRIC DELIVERY WAGON.
ONE 1,500-POUND DELIVERY WAGON.
ONE 1,500-POUND ELECTRIC PASSENGER WAGONETTE.
ONE 2,500-POUND ELECTRIC BAGGAGE TRANSFER TRUCK.
ONE 7,000-POUND ELECTRIC STAKE TRUCK.

All the Studebaker vehicles exhibited were of the chain-driven electric type. Lever steering is provided on the models below 2,500 pounds; on the larger models a vertical-pillar steering wheel is used.

On account of the cramped space in the truck section the ambulance and the wagonette were exhibited in the electric pleasure-car stand of the same maker.

An interesting construction embodied in the ambulance was the provision of semi-elliptic springs interposed between the body proper and the frame, giving a double suspension at the rear end of the vehicle; the front end was simply hinged on the frame sides.

One point which appears to have received special attention from the designs of the Studebaker vehicles is the seat and control apparatus location, especially in the larger vehicles. The result is that these important parts do not occupy any more space than the seat of an ordinary horse truck, leaving the maximum possible amount of platform space available for the useful load.

In addition to the exhibit at the Garden show the Studebaker Automobile Co. had a special display of electric commercial vehicles at the salesrooms in Longacre Square, New York, consisting of a 3½-ton stake truck, 2,500-pound parcel delivery wagon, 800-pound panel body wagon, 1,500-pound delivery wagon, and a gasoline motor ambulance. A large electric opera bus was used to carry interested visitors between the Garden and the city salesrooms of the company.

E. R. Thomas Motor Co., Buffalo, N. Y.

ONE TAXICAB WITH LANDAULET BODY.
ONE TAXICAB WITH OPEN SURREY BODY.

The chassis employed in the vehicles exhibited by the Thomas company are of the well-known type extensively used in taxicab service in various parts of the country. No important changes in design have been made.

A novel type of body was shown on one of the vehicles intended for summer work and for cities where the climate makes an open carriage desirable. It closely resembles the surrey type and is provided with a folding top as a protection against rain or sun. The general lines and the low center of gravity of the body give a very pleasing appearance to the whole.

The Thomas engine is housed under a very short hood, leaving ample body space. A feature of the control apparatus is a bronze casing completely protecting the lower end of the side levers against the mud and dust which might interfere with their ease of operation.

FIRST SHOW APPEARANCE OF THE ALDEN SAMPSON TRUCK IN MADISON SQUARE GARDEN

Data of the Electric Commercial Vehicles Exhibited at the New York Shows in January, 1909

Under the heading, "Where Exhibited," the letter "P" signifies Grand Central Palace, and "M" Madison Square Garden

Class	Where Exhibited	Name	Load capacity, Pounds	Price	Tare, Pounds	Useful Space on Frame	Height of Platform, Inches	Wheelbase, Inches	Tread, Inches	Normal Speed, M.P.H.	Motors		Number of Cells	Mileage on Charge	Drive	Brake			Tires		Model Referred to
											Number	Location				Type	Location	Operation	Front	Rear	
Vehicles of a capacity of 3,000 pounds and over	M.	General Electric	7,000	$4,000		16' 7" x 6' 7"	40½	125	65	7	1	In front of axle	44	35	3 Chains	Expanding	Hub	Foot	36x6	36x3½ Dual	Stake Truck
	M.	General Electric	4,000	3,400		15' 1" x 6' 2"	42	111½	61	8½	1	In front of axle	44	40	3 Chains	Expanding	Hub	Foot	36x4	36x2½ Dual	Stake Truck
	P.	Lansdeo	4,000	3,600	4,500	11' 8" x 4' 6"	35	112	66	8	1	Center of frame	60	35	3 Chains	Expanding	Hub	Foot	32x4	32x4	Platform Truck
	P.	Lansden	4,000	1,750	2,750	14' 6" x 4'	28	120	52	4½	1	Center of frame		18	3 Chains	Expanding	Hub	Lever	Steel	24x6	Dock Truck
	M.	Studebaker	7,000			13' 1" x 4' 8"	40	127	75	9	2	In front of axle	44	30	2 Chains	Expanding	Hub	Foot	36x5	36x4 Dual	Stake Truck
Vehicles of a capacity of 1,500 to 3,000 pounds	P.	Commercial	2,000	3,000			34	100	62	12	1	In front of axle	40	60	Worm	Expanding	Hub	Foot	34x3½	36x4	Chassis
	M.	General Electric	2,000	2,650		12' 8" x 6'	33	102	60	10	1	In front of axle	44	40	3 Chains	Expanding	Hub	Foot	32x3½	32x3½	Express
	P.	Lansdeo	2,000	2,450	3,000	8' 3" x 3' 10"	31	88	56	10	1	Center of frame	60	35	3 Chains	Expanding	Hub	Foot	32x3	32x3	Express
	P.	Lansden	1,500	2,650	3,000	7' 6" x 3' 7"	31	88	56	11	1	Center of frame	60	40	3 Chains	Expanding	Hub	Foot	32x3	32x3	Panel Wagon
	P.	Pittsburg	2,000	2,400	4,000		34	96	64	9	2	In front of axle	42	40	2 Chains	Contracting	Hub	Foot	34x3½	34x3½	Panel Wagon
	M.	Studebaker	2,500			9' 7" x 3' 7"	38	104	58	9½	2	In front of axle	44	35	2 Chains	Expanding	Hub	Foot	36x4	42x4	Truck
	M.	Studebaker	1,500			6' 10" x 3' 3"	36	91	56	11	2	In front of axle	44	35	2 Chains	Expanding	Hub	Foot	36x3	42x3	Panel Wagon
Vehicles of a capacity of less than 1,500 pounds	M.	Champion	1,000	2,200	2,600	7' x 3' 6"	32	80	58	10½	1	In front of axle	40	40	2 Chains	Expanding	Hub	Foot	36x3	36x3	Delivery Van
	P.	Commercial	1,000	2,500			36	90	56½	15	1	In front of axle	40	60	Worm	Expanding	Hub	Foot	36x3	40x3	Chassis
	M.	General Electric	1,000	2,200		10' 6" x 5' 7"	31	83½	55	11	1	In front of axle	44	40	3 Chains	Expanding	Hub	Foot	32x2½	32x2½	Delivery Van
	M.	General Electric	350	1,800		9' 6" x 5'	38	70	50	14	1	In front of axle	44	50	3 Chains	Expanding	Hub	Foot	30x2	30x2	Delivery Van
	P.	Pittsburg	1,000	1,800	2,500		34	75	54	11	1	In front of axle	22	40	2 Chains	Contracting	Hub	Foot	34x2½	34x2½	Delivery Van
	M.	Studebaker	800			6' 10" x 3'	34	84	59	11	1	In front of axle	24	30	2 Chains	Expanding	Hub	Foot	36x2½	42x2½	Delivery Van

Data of the Gas-motor Commercial Vehicles Exhibited at the New York Shows in January, 1909

Class	Where Exhibited	Name	Load Capacity	Price	Tare, Pounds	Useful Space on Frame	Height of Platform, Inches	Wheelbase, Inches	Tread, Inches	Gasoline Capacity, Gallons	Location of Driver's Seat	Nominal H.P.	Cylinders					Cooling System	Water Circulating Means	Radiator	Carburetter	Ignition	
													Bore, Inches	Stroke, Inches	No. of Cylinders	How Disposed	Location of Valves					Magneto	Battery
Vehicles of a capacity of four tons and over	M.	Alden-Sampson	4 Ton	$4,250	6,000	Optional	32	144	68	23	Above Motor	40	5	5½	4	Pairs	Same side	Water	Thermo-S'n	Tubular	Schebler	Splitdorf	Dry
	M.	Hewitt	5 Ton	4,500		14' x 8' 8"	45	138	68	37	Alongside M'r	36	4½	5½	4	Pairs	Same side	Water	Cent. Pump	Cellular	Schebler	B'ch H T	
	M.	Knox	5 Ton	4,300	5,600	14' 6" x 6'	36	154	67	38	Above Motor	48	5½	5½	4	Separate	Cyl. Head	Water	Cent. Pump	H'comb	Str'm'berg	B'ch H T	
	P.	Manhattan	5 Ton	4,800	7,200	15' 6" x 5'	48	136	56	20	Optional	50	5½	6	4	Pairs	Same side	Water	Vane pump	Tubular	Mack	B'ch H T	Storage
	P.	Rapid	5 Ton	4,800	7,500	14'	36	160	68	25	Above Motor	60	5½	6	4	Pairs	Same side	Water	Cent. Pump	Tubular	Schebler	B'ch H T	
	P.	Saurer	5 Ton	5,000	6,000	12' x 6'	30	153	64	25	Behind Motor	40	4¾	5½	4	Pairs	Opp. sides	Water	Cent. Pump	H'comb	Saurer	B'ch H T	
Vehicles of a capacity of three to four tons	P.	American	3 Ton	3,500	5,000	Optional	40	118	62	20	Above Motor	55	5	6	4	Separate	Same side	Water	Cent. Pump	Tubular	Buffalo		Storage
	P.	Gramm-Logan	3 Ton	3,500	5,300	Optional	36	120	62	20	Above Motor	35	4½	5	4	Pairs	Same side	Water	Cent. Pump	H'comb	Schebler	Splitdorf	Storage
	P.	Reliance	3 Ton	3,750	5,000	13' 6" x 3'	36	132	58	22	Above Motor	60	5¼	5	4	Separate	2-cycle	Water	Natural	H'comb	Reliance	Optional	Storage
Vehicles of a capacity of one to three tons	P.	American	1 Ton	1,750	2,500	Optional	34	Op'l	58	12	Behind Mot'r	20	4	4½	4	Pairs	Opp. sides	Water	Cent. Pump	Cellular	Buffalo		Storage
	M.	Franklin	2 Ton	2,500	2,550	10' 6" x 5'	36	100	53½	12	Above Motor	18	3¾	4	4	Separate	Head	Air			Franklin	B'ch H T	
	P.	Grabowsky	2 Ton	2,750	3,900	Optional	39	127	60	12	Behind Motor	35	5½	5	2	Opposed	Horizontal	Water	Natural	Tubular	Schebler	Schebler	Storage
	P.	Grabowsky	1 Ton	2,100	3,100	Optional	34	102	60	12	Behind Motor	35	5½	5	2	Opposed	Horizontal	Water	Natural	Tubular	Schebler	Schebler	Storage
	M.	Hewitt	2 Ton	2,750		9' x 4'	36	112	60	20	Above Motor	24	5½	5	2	Opposed	Horizontal	Water	Natural	Cellular	Schebler	B'ch H T	
	M.	Knox	2 Ton	3,500	4,200	10' x 4' 8"	36	125	60	25	Above Motor	36	4¾	5½	4	Separate	Head	Air			Stromb'g	B'ch H T	
	M.	Knox	1½ Ton	2,600	3,200	9' 3" x 4' 8"	36	100	56	16	Above Motor	16	5	5	2	Separate	Head	Water	Cent. Pump	H'comb	Stromb'g		Storage
	P.	Rapid	2 Ton	2,000	3,200	Optional	32	Op'l	56	16	Above Motor	28	5½	5	2	Opposed	Horizontal	Water	Cent. Pump	Cellular	Schebler		Storage
	P.	Rapid	1 Ton	1,750	2,800	Optional	32	Op'l	56	16	Above Motor	24	5	5	2	Opposed	Horizontal	Water	Cent. Pump	Cellular	Schebler		Storage
	P.	Reliance	2 Ton	3,100	4,000	10' x 3'	36	108	58	22	Above Motor	45	5¼	5	3	Separate	2-Cycle	Water	Natural	H'comb	Reliance	Optional	Storage
Vehicles of a capacity of less than one ton (capacity given in pounds)	P.	Atlas	1,200	1,900	2,300	5' x 4'	22	102	56	16	Behind Motor	20	4½	4½	2	Separate	2-Cycle	Water	Natural	Tubular	Atlas		Atw. K't
	M.	Autocar	1,800	2,000		7' 6" x 4'	30	85	56	12	Above Motor	18	4¾	4½	2	Opposed	Horizontal	Water	Centrifugal	Cellular	Schebler	Splitdorf	
	P.	Brush	500	600	900			74	56	6	Behind Motor	7	4	4	1	Vertical	Side by side	Water	Natural	Cellular	Brush		Storage
	M.	Franklin	1,000	2,000	1,750	8' x 3' 8"	30	83	53½	12	Above Motor	18	3¾	4	4	Vertical	Head	Air			Franklin	B'ch H T	
	P.	Gramm-Logan	1,500	1,600	2,400	Optional	32	98	56	15	Optional	25	4	4	4	Separate	Head	Air			Carrico	Splitdorf	
	P.	Hart-Kraft	1,000	1,050	1,500	10' x 3'	30	90	56	10	Behind Motor	14	4½	4	2	Opposed	Horizontal	Water	Natural	Tubular	Schebler	Splitdorf	Dry Cells
	P.	Kiblinger	800	475	1,350	7' 3" x 2' 8"	31	69	56		Above Motor	16	4½	4½	2	Opposed	Horizontal	Air			McIntyre		Dry Cells
	P.	Maxwell	1,000	1,400	1,200	4' 2" x 3' 4"	32	96	56	14	Behind Motor	20	5	5	2	Opposed	Horizontal	Water	Natural	H'comb	Maxwell	H T	Storage
	M.	Reading	200	350								4	3 5/16	3½	1	Vertical	Side by side	Air			Reading		Storage

Class	Where Exhibited	Name	Lubrication	Clutch	Gearset	No. of Speeds Forward	Final Drive to Rear Wheels	Service Brake			Emergency Brake			Frame	Bearings			Springs		Tires		Model Referred to
								Type	Location	Operation	Type	Location	Operation		Motor	Gearbox	Axles	Front	Rear	Front	Rear	
Vehicles of a capacity of four tons and over	M.	Alden-Sampson	Forcefeed	Cone	Selective	4	Side Ch'ns	Contr'g	Drive Shaft	Foot	Exp'd'g	Hub	Lever	Channel Steel	Plain	Hess B	Timken	½ Elliptic	½ Elliptic	36x5	36x4 Dual	Chassis
	M.	Hewitt	Forcefeed	Cont'g	Planetary	4	Side Ch'ns	Exp'd'g	Different'l	Foot	Exp'd'g	Hub	Lever	Pressed Steel	Plain	Plain	Timken	½ Elliptic	½ Elliptic	4"t'n b	5"t'n bl'ck	Chassis
	M.	Knox	Forcefeed	3 Disc	Selective	3	Side Ch'ns	Contr'g	Sprockets	Foot	Exp'd'g	Hub	Lever	Channel Steel	Plain	Timken	Timken	½ Elliptic	½ Elliptic	36x5	36x4 Dual	Chassis
	P.	Manhattan	Forcefeed	Cone	Individual	4	Side Ch'ns	Contr'g	Transmis'n	Foot	Exp'd'g	Hub	Lever	Channel Steel	Plain	Hess B	Timken	½ Elliptic	Optional	Opt'l	Optional	Chassis
	P.	Rapid	Lavigne	Disc	Selective	4	Side Ch'ns	Contr'g	Sprockets	Foot	Exp'd'g	Hub	Lever	Channel Steel	Plain	Hess B	Timken	Platf'm	Platf'm	6"	4" Dual	Chassis
	P.	Saurer	Forcefeed	Cone	Selective	4	Side Ch'ns	Contr'g	Jackshaft	Foot	Exp'd'g	Hub	Lever	Channel Steel	Ball	Ball	Ball	½ Elliptic	½ Elliptic	46x4½	42x4½ D'l	Chassis
Vehicles of a capacity of three to four tons	P.	American	Forcefeed	Disc	Planetary	2	Side Ch'ns	Contr'g	Jackshaft	Foot	Exp'd'g	Hub	Lever	Arm'd Wood	Plain	Plain	Timken	½ Elliptic	Platf'm	36x5	36x4 Dual	Chassis
	P.	Gramm-Logan	Forcefeed	Disc	Progressive	3	Side Ch'ns	Contr'g	Jackshaft	Foot	Exp'd'g	Hub	Lever	Channel Steel	Plain	Timken	Timken	½ Elliptic	Platf'm	36x5	36x3½	Chassis
	P.	Reliance	Forcefeed	Cone	Progressive	3	Side Ch'ns	Contr'g	Sprockets	Foot	Contr'g	Hub	Lever	Channel Steel	Plain	Ball	Roller	½ Elliptic	½ Elliptic	36x5	36x3½	Chassis
Vehicles of a capacity of one to three tons	P.	American	Hancock	Cone	Selective	3	Side Ch'ns	Exp'd'g	Sprockets	Foot	Exp'd'g	Hub	Lever	Channel Steel	Plain	Plain	Timken	½ Elliptic	Platf'm	32x2½	32x2½	Chassis
	M.	Franklin	Forcefeed	Disc	Progres've	3	Worm G'r	Contr'g	Line shaft	Foot	Contr'g	Hub	Lever	Wood	Plain	Plain	Timken	Full Ell'c	½ Elliptic	32x3	32x3 Dual	Chassis
	P.	Grabowsky	Lavigne	Cone	Planetary	2	Side Ch'ns	Contr'g	Line Shaft	Foot	Exp'd'g	Hub	Lever	Pressed Steel	Plain	Timken	Timken	½ Elliptic	Platf'm	34x4	34x5	Chassis
	P.	Grabowsky	Lavigne	Cone	Planetary	2	Side Ch'ns	Contr'g	Line Shaft	Foot	Exp'd'g	Hub	Lever	Pressed Steel	Plain	Timken	Timken	½ Elliptic	Platf'm	32x3½	32x3½	Chassis
	M.	Hewitt	Forcefeed	Cont'g	Planetary	2	Side Ch'ns	Exp'd'g	Different'l	Foot	Exp'd'g	Hub	Lever	Channel Steel	Plain	Plain	Timken	½ Elliptic	½ Elliptic	34x4	34x3½ D'l	Chassis
	M.	Knox	Forcefeed	3 Disc	Selective	3	Side Ch'ns	Contr'g	Jackshaft	Foot	Exp'd'g	Hub	Lever	Channel Steel	Plain	Timken	Timken	½ Elliptic	½ Elliptic	34x4	34x5	Chassis
	M.	Knox	Forcefeed		Planetary	2	Side Ch'ns	Contr'g	Jackshaft	Foot	Exp'd'g	Hub	Lever	Channel Steel	Plain	Plain	Timken	½ Elliptic	½ Elliptic	34x3½	34x4	Chassis
	P.	Rapid	Lavigne		Planetary	2	Side Ch'ns	Contr'g	Reverse G.	Lever	Exp'd'g	Hub	Lever	Channel Steel	Plain	Timken	Timken	Platf'm	Platf'm	32x4	32x4	Chassis
	P.	Rapid	Lavigne		Planetary	2	Side Ch'ns	Contr'g	Reverse G.	Lever	Exp'd'g	Hub	Lever	Channel Steel	Plain	Timken	Timken	Platf'm	Platf'm	32x3½	32x3½	Chassis
	P.	Reliance	Forcefeed	Cone	Progres've	3	Side Ch'ns	Contr'g	Sprockets	Foot	Contr'g	Hub	Lever	Channel Steel	Plain	Ball	Roller	½ Elliptic	Platf'm	32x4	32x3 Dual	Chassis
Vehicles of a capacity of less than one ton (capacity given in pounds)	P.	Atlas	Forcefeed	Cont'g	Sliding	2	Shaft	Contr'g	Transmis'n	Foot	Exp'd'g	Hub	Lever	Pressed Steel	Plain	Timken	Timken	½ Elliptic	½ Elliptic	30x4	30x4	Del. Van
	M.	Autocar	Forcefeed	Ring	Progres've	3	Shaft	Contr'g	Axle	Foot	Contr'g	Hub	Lever	Channel Steel	Ball	Roller	Timken	½ Elliptic	Full Ell'c	32x3½	32x3½	Chassis
	P.	Brush	Exhaust	Disc	Individual	2	Side Ch'ns		Reverse		Exp'd'g	Hub	Foot	Wood	Plain	Ball	Ball	Coil	Coil	32x2	32x2	Del. Van
	M.	Franklin	Forcefeed	Disc	Progres've	3	Worm G'r	Contr'g	Line Shaft	Foot	Contr'g	Hub	Lever	Wood	Plain	Plain	Timken	Full Ell'c	½ Elliptic	32x2½	32x3	Chassis
	P.	Gramm-Logan	Kinsey	Disc	Progres've	2	Side Ch'ns	Contr'g	Hub	Foot	Exp'd'g	Hub	Lever	Channel Steel	Plain	Timken	Timken	½ Elliptic	Full Ell'c	34x3	34x3	Chassis
	P.	Hart-Kraft	C'pre's'n	Disc	Planetary	2	Side Ch'ns		Reverse	Lever	Contr'g	Hub	Pedal	Wood	Plain	Hyatt	Timken	Full Ell'c	Full Ell'c	36x2	36x2	Chassis
	P.	Kiblinger	C'pre's'n	Disc	Planetary	2	Side Ch'ns		Reverse	Lever	Contr'g	Hub	Pedal	Angle Steel	Plain	Plain	Plain	Full Ell'c	Full Ell'c	34x1½	34x1½	Del. Car
	P.	Maxwell	C'pre's'n	Disc	Progres've	3	Shaft	Contr'g	Hub	Pedal	Exp'd'g	Hub	Lever	Pressed Steel	Plain	Plain	Timken	½ Elliptic	½ Elliptic	30x3½	30x4	Del. Car
	M.	Reading	Hand		Planetary	2	Chain	Contr'g	Hub	Pedal				Tube	Plain		Ball	Coils		26x2½	26x2½	Cycle

Data of the Taxicabs Exhibited at the New York Shows in January, 1909

Where Exhibited	Name	Price	Tare, Pounds	Wheelbase, Inches	Tread, Inches	Fuel Capacity, Gallons	Horsepower, Rated	Cylinders					Cooling	Water Circulating Means	Radiator	Carbureter	Ignition	Lubrication	Clutch
								Bore, Inches	Stroke, Inches	Number	Disposition	Valve Location							
P.	Bristol	$3,200	2,750	106	53	10	20	3¾	4½	4	Bloc	Same side	Water	Centrifugal Pump	Tubular	Breeze	Bosch H. T.	Forcefeed	3 Discs
P.	Cleveland	3,000	2,700	106	54	10	20	3¾	4	4	Pairs	Same side	Water	Centrifugal Pump	Honeycomb	Cleveland	Optional	Forcefeed	Disc
P.	De Dion		2,400	92½	48	9	9	4	5½	1	Single	Same side	Water	Centrifugal Pump	Honeycomb	De Dion	Nilmelior	Forcefeed	Cone
P.	De Dion		2,500	92½	48	10	12	3	4	4	Pairs	Same side	Water	Centrifugal Pump	Honeycomb	De Dion	Nilmelior	Forcefeed	Disc
M.	Franklin	2,850	2,200	100	53½	15	18	3¼	4	4	Separate	Head	Air			Franklin	Bosch H. T.	Forcefeed	Disc
P.	Sultan	2,250	2,450	98½	53½	10	12	3	4⅜	4	Pairs	Same side	Water	Natural	Tubular	Sultan	Bosch H. T.	Forcefeed	Disc
M.	Thomas	3,000	2,610	103	56	15	20	3½	3 15/16	4	Bloc	Same side	Water	Centrifugal Pump	Tubular	Thomas	Bosch H. T.	Forcefeed	Disc

Where Exhibited	Name	Gearset	No. of Speeds Forward	Final Drive	Service Brake			Emergency Brake			Frame	Bearings			Springs		Tires
					Type	Location	Operation	Type	Location	Operation		Motor	Gearbox	Axles	Front	Rear	
P.	Bristol	Selective	3	Shaft	Contracting	Hub	Foot	Expanding	Hub	Lever	Pressed Steel	Plain	Ball	Ball	¾ Elliptic	¾ Elliptic	32x4
P.	Cleveland	Selective	3	Shaft	Contracting	Transmission	Foot	Expanding	Hub	Lever	Pressed Steel	Plain	Plain	Ball	¾ Elliptic	¾ Elliptic	32x4
P.	De Dion	Selective	3	Shaft	Contracting	Transmission	Foot	Expanding	Hub	Lever	Pressed Steel	Plain	Ball	Ball	¾ Elliptic	¾ Elliptic	30x3½
P.	De Dion	Selective	3	Shaft	Contracting	Transmission	Foot	Expanding	Hub	Lever	Pressed Steel	Plain	Ball	Ball	¾ Elliptic	¾ Elliptic	32x3½
M.	Franklin	Selective	3	Shaft	Contracting	Transmission	Foot	Contracting	Hub	Lever	Wood	Plain	Ball	Ball	Full Ellip'c	Full Ellip'c	30x4
P.	Sultan	Progressive	3	Shaft	Expanding	Transmission	Foot	Expanding	Hub	Lever	Pressed Steel	Plain	Ball	Ball	¾ Elliptic	¾ Elliptic	32x4
M.	Thomas	Selective	3	Shaft	Contracting	Transmission	Foot	Expanding	Hub	Lever	Pressed Steel	Plain	Ball	Ball	¾ Elliptic	¾ Elliptic	32x4

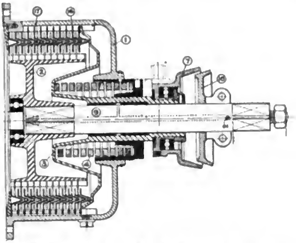
COMPONENTS AND ACCESSORIES AT THE SHOWS

IN the line of commercial vehicle components and sundries there were exhibited at the recent New York shows many parts and fitments which should be of considerable interest to the builder and the user alike. These were more especially found in those lines where knowledge and methods of construction of a highly specialized character are necessary, such, for example, as in the manufacture of magnetos for ignition. In other cases the advantages to be derived from standardization and the desirability of quantity production, to bring cost within reasonable limits, were manifestly responsible for the display of products, such as anti-friction bearings and axles. The exhibits of the makers of such components together with those of concerns engaged in the manufacture or sale of other parts of materials directly connected with the construction or use of commercial vehicles are discussed in the following report of the 1909 Palace and Garden shows. It will be noticed that there is an absence of certain fitments, such as lamps and warning devices, which do not seem to have received the attention of manufacturers that might reasonably be expected. There is an imperative need for suitable accessories of this kind substantially made to successfully withstand the harder service and rougher handling to which they are subjected in commercial work.

Finished Component Parts

Although the trade in component parts and mechanical units for commercial vehicles of other than the lighter class is not widely developed there were exhibited at the two shows a number of mechanisms specially designed for heavy work which were of considerably more than passing interest.

The well-known Hele Shaw clutch was shown by the Merchant & Evans Co., of Philadelphia, in its new form based upon the use of pressed metal discs instead of the cast or machined discs previously employed. This clutch is of the multiple disc type, its main characteristic consisting in the employment of grooved discs instead of the usual flat plates. The accompanying illustration is a sectional view of the model best suited for truck use.

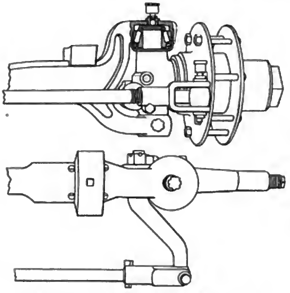


SECTIONAL VIEW OF HELE SHAW CLUTCH

The outer or driving discs are made of a special bronze alloy, the inner or driving discs are steel stampings. The bronze plates are notched on their periphery to match keys formed integral with the outer clutch casing (*1*) which is bolted to the flywheel of the engine. The steel plates are notched on their inner circumference and slide on keys formed upon the drum (*2*) which drives the clutch shaft through its square-bored hub. To bring the necessary pressure to secure driving friction between the plates a "sliding presser" (*3*) is submitted to the action of the clutch spring (*4*) and compresses the pack of plates, gradually forcing the grooves together until sufficient friction is developed to provide the transmission of the totality of the driving torque. The clutch pedal operates this presser through an actuating ring (*7*) and a ball thrust bearing. A clutch brake is formed by a small cone (*10*) and is used to give rapid retardation of the gear shaft in order to facilitate gear changes. The casing enclosing the clutch is oil-tight and the fact that the clutch runs in oil considerably assists its gradual picking of the load as the oil has to be expelled from between the plates before full engagement is obtained. This clutch is very widely used on motor buses in France and England.

On the same stand were also shown several types of axles well suited for taxicab construction, including a live rear axle with the change speed gear integral in the differential casing. This gear was of the sliding type and provided three speeds forward, the two highest of which were direct drives, and the usual reverse.

Besides their roller bearings, to which reference is made under the proper heading, the Timken Roller Bearing Axle Co., of Canton, Ohio, had on show an interesting line of axles specifically built for use in trucks and vehicles of the heaviest class. In the adjoining cut are shown the knuckle and hub of their nine-ton I-beam front axle. This axle is fitted with their renowned roller bear-



DETAIL OF TIMKEN HEAVY FRONT AXLE

ings in the hubs as well as in the knuckle arms, one of which is shown in section to illustrate the disposition of the parts. The wheel spindle is 2 5-8 inches in diameter, the axle proper is 4 by 2 1-2 inches in section, and the regular tread is 58 inches. The use of roller bearings in the knuckle arm is of special advantage under such heavy loads, in that it provides a sufficient ease of steering which would entirely be out of question were the weight of the vehicle carried on plain washers, as is permissible under lighter loads. A similar but lighter axle intended for loads not over four tons was also shown.

Considering that in most cases trucks of a capacity ranging between the limits mentioned are provided with driver seats above the engine, the steering connections in these axles are arranged for the reception of a transverse connecting rod between the steering gear and the steering arms; they, however, can be altered to accommodate a fore-and-aft connecting rod.

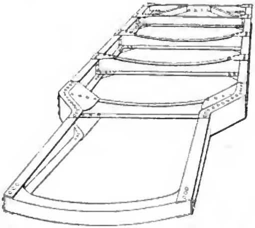
In the same line of thought the Timken exhibit comprised a number of sizes of square section forged axles fitted with roller bearing hubs for chain-driven trucks between one and twelve tons total weight.

The Timken live axles for taxicabs exhibited were all of the pressed-steel type and made for vehicles weighing not over one ton empty.

The Spicer universal joints shown by the Spicer Universal Joint Mfg. Co., of Plainfield, N. J., command attention as being entirely dust-proof and oil-tight. They are made for shafts up to two inches in diameter and will transmit without other than normal wear any power usually taken through shafts of corresponding sizes in vehicle work.

The Warner Gear Co., Muncie, Ohio, exhibited a steering gear with vertical pillar and large diameter wheel suitable for light trucks and delivery wagons. This gear is of the usual worm-and-gear type.

Although pressed-steel frames are not yet widely used in truck construction, it is not to be doubted that their employment will gradually take a considerable extension, and the accompanying illustration represents a very strong sample of the type made by the A. O. Smith Co., of Milwaukee, Wis., which exhibited models of its product.

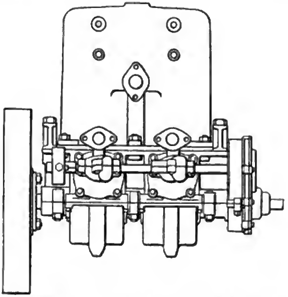


SMITH PRESSED STEEL TRUCK FRAME

The cross members are united to the frame sides by strong riveted gusset plates and the front member is horizontally curved to form a radiator protecting bumper.

Motors for Commercial Use

As there are very few builders of gas motors specially designed for motor trucks in the country it was not to be expected that there would be many exhibits of this sort, especially at pleasure car shows. The most interesting novelty was the Willett two-cycle engine built by the Willett Engine & Carbureter Co., of Buffalo, N. Y., in sizes from a single cylinder, rated at 8 horsepower, to a six-cylinder, rated at 60 to 70 horsepower. This motor, of the two-cylinder type, is illustrated in the accompanying sketch showing the inlet side. The gas admission to the crankcase is controlled by a rotary valve for each cylinder operated by bevel gears from a gear shaft, to the front end of which a spur gear is fitted meshing with a similar gear on the forward extension of the crankshaft. The rotary valve is in the form of a circular plate with a large port opening. This valve is seated at the base of the inlet pipe, and all the gears are housed and run on annular ball bearings. The location of the valves and gear shaft will be readily seen by inspection of the sketch. The gear case at the front of the motor extends clear across, and on the opposite side from that shown in the sketch there is a seating for a mechanical oiler and magneto driven by one shaft extending rearwardly from the front gear case. The whole makes a very compact unit. The rotary valve, already referred to, is made of cast iron working on a bronze seat and the makers claim that in operation it is self-grinding and self-adjusting, springs in the dog which rotates the valve taking up wear. The crank bases are separate, as the sketch shows, and are readily removable for inspection of the big ends. A suitable carbureter is supplied by the makers, who state that the motor is extremely flexible. The cylinders are water-cooled and are designed with water passages for thermo-syphon cooling.



WILLETT TWIN CYLINDER TWO-CYCLE MOTOR

A four-cylinder motor, with cylinders 4 1-4 by 4 1-2 inches, built on the four-cycle principle, suitable for taxicabs or delivery wagons, was shown by the Milwaukee Motor Co., of Milwaukee, Wis., under the name "Imperial." This has the valves on one side and is fitted with carbureter, fan and water pump and connections for cooling. This company also builds larger motors and all are constructed on the interchangeable plan.

The Brennan Motor Co., of Syracuse, N. Y., which is one of the old-established concerns, showed both horizontal and vertical motors. One of the latter rated at 50 horsepower, with four cylinders 5 1-2 by 6 inch, was designed especially for heavy duty. The inlet valves are located in the cylinder heads and the exhaust on the side, the former being actuated by overhead rocker arms—all valves are driven by one camshaft. The cylinders are cast separately and the crankshaft, which is made of alloy steel, has five bearings.

A light and compact horizontal double-opposed air-cooled motor, suitable for light delivery wagons, was shown by the Reeves Pulley Co., of Columbus, Ind. This has cylinders 4 3-8 inch by 4 inch and is of 15.3 horsepower, A. L. A. M. rating. The total weight, including flywheel, is 230 pounds.

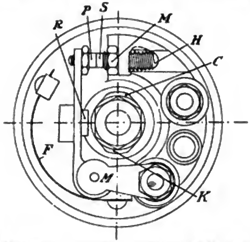
Very well finished four-cylinder, four-cycle, water-cooled motors were shown by the American & British Mfg. Co., of Bridgeport, Conn., and by the F. A. Brownell Motor Co., of Rochester, N. Y.

Magnetos for Motor Ignition

Among the accessory exhibits those pertaining to ignition should be of special interest to the owner or the operator of commercial vehicles. The great predominance of high-tension magneto ignition was distinctly noticeable in a survey of these exhibits and the favor with which the work vehicle builders look upon this system is clearly exemplified by the tables published in this issue, giving the ignition characteristics of all the business vehicles exhibited at the two shows.

The magneto is specially valuable in vehicles having to perform utilitarian service in that it, more than any other ignition system, is relieved of practically every factor of uncertainty or unreliability. Depending exclusively on mechanical production of the current, it is freed of the constant necessity for attention which characterizes batteries of either the storage or the dry type. There is not, with a magneto, any risk of accidental exhausting of the source of current and as long as the motor is running and whenever there is motion at the crankshaft there is current supplied at the spark plugs. One of the main hindrances to the introduction of the magneto in the past was the greater difficulty in starting, and in many cases battery ignition was fitted for this purpose. The latest improvements in magneto construction, which will be reviewed in the following, have removed this objection, and the "battery for starting" feature is becoming a thing of the past, the magneto alone being in most cases depended upon exclusively and at all times.

A very complete line of the well-known Eisemann magnetos was shown by the Lavalette Co., of New York. The Eisemann magneto is one of the pioneer instruments of the type for motor vehicle use and its origin can be traced to the Eisemann dynamo, with which the early Panhard pleasure cars were fitted long before any other mechanical method of producing ignition current was used on automobiles. The former models of Eisemann magneto comprised a separate coil; improvements in the construction of the insulators have made it possible to now build up the coil integral with the magneto without risk of accidental short-circuiting. This considerably simplifies the wiring and reduces it to a strict minimum.



EISEMANN MAGNETO CONTACT BREAKER

In the accompanying line drawing is shown the make-and-break mechanism of the Eisemann magneto. The whole of this device is mounted on a round metal base which can be taken off readily from the magneto by use of the fingers only. This allows ready and convenient resetting of the platinum points. The moving point *P* is mounted at the end of an L-shaped arm pivoted at *M*. the tension of the flat spring *F*, which normally bears against the casing, gives the necessary contact pressure between the points. The fixed point *S* is adjustable through its slotted head *H* and the lock nut *M*. A notable feature of the contact point *P* is that instead of being riveted, as is usual, it is screwed on the end of its operating lever, making its replacement extremely easy. The motion of the L-shaped lever is produced by the contact of a double toe cam *K* with the hard metal block *R*. The distributer, which is driven by a light two-to-one gear from the armature shaft consists in a very simple radial finger carrying a carbon brush coming into contact with four brass sectors connected with the sparking plugs in the cylinders in the proper sequence of firing.

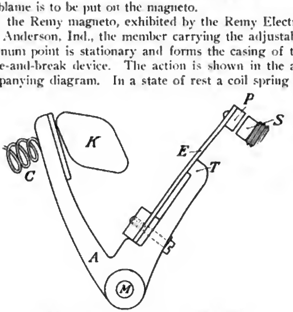
The magneto should be driven at the same speed as the crankshaft in four-cycle motors and at twice that speed in two-cycle motors.

Another well-known and old-established magneto is the Bosch, which was exhibited in both the high and the low-tension types by the Bosch Magneto Co., of New York. The low-tension magneto is intended for use in motors fitted with mechanical make-and-break within the cylinders; considering the greater popularity of high tension in commercial work, we shall give this latter type more special attention. The spark given by the Bosch high-tension magneto is claimed to be especially valuable for ignition purposes as it is said to consist in a high-tension spark which bridges the gap between the spark plug point and is used as a core or conductor for a hot low-tension spark produced when the platinum points again come in contact after their breaking apart. The winding, in which are generated the high and the low-tension currents, are both carried by the rotating armature of the magneto. The make-and-break device is operated by two metal blocks disposed externally to the rotating plate carrying it, and against which the tail of the L-shaped arm, on which is mounted one of the platinum points, strikes in its passage, thus causing the sudden break which corresponds to the production of the spark at the plugs.

In the U & H magneto sold in this country by the J. S. Bretz Co., of New York, which make the exhibit, the most salient feature is a device by which an instantaneous break producing a very strong spark is obtained when starting the motor, no matter how slow the speed of cranking may be. The U & H device operates through a strong coil spring entirely protected by the armature casing and is automatically thrown out of action when the speed becomes high enough to provide for a sufficiently quick break.

In the Hess-Bright magneto, made and shown by the Hess-Bright Mfg. Co., of Philadelphia, an important feature has also been made of ease of starting. It is claimed that the machine will give a spark satisfactory for all purposes at a speed as low as thirty revolutions per minute, and this without the embodiment of any special device in the construction. Another important characteristic of this machine is its smoothness of outline and the substantial size of the wearing parts. A minor feature of interest in the Hess-Bright magneto is the provision of a glass sight in front of the distributer and the provision of a visible spark gap which, in case of trouble, will at once show without any removal of parts whether the blame is to be put on the magneto.

In the Remy magneto, exhibited by the Remy Electric Co., Anderson, Ind., the member carrying the adjustable platinum point is stationary and forms the casing of the make-and-break device. The action is shown in the accompanying diagram. In a state of rest a coil spring *C*, acting on a V-shaped arm *A*, brings the point *P* carried by a flat spring *E* into pressure contact with the fixed screw *S* held by the casing, as mentioned in the foregoing. When the cam *K*, carried by the armature spindle pushes the lever *A* to the left, the toe *T* comes in contact with the spring *E* and suddenly breaks the contact at the points.



REMY MAGNETO CONTACT BREAKER

In the Pittsfield magneto, shown by the Pittsfield Spark Coil Co., of Dalton, Mass., the armature is fitted with four poles; this means that four sparks are produced for each revolution of the spindle with the result that no two-to-one gears are needed as in other magnetos to drive the distributer at half speed. As a consequence of this construction the magneto is driven at the same speed as the camshaft and preferably by an extension of the latter for the sake of simplicity. This armature construction also considerably simplifies the design of the magneto as a whole. At one end is mounted the make and break device and at the other end is a simple distributer from which are led the wires to the different spark plugs.

In the Fulmina magneto, imported and exhibited from Germany by the L. H. Lehman Mfg. Co., of New York, the construction shows considerable care in the working out of the details and a very high degree of excellence in the workmanship. The design is such that no tools are required for the examination and dismounting of the parts; the different units are assembled and held in place by bayonet joints and spring catches.

In the Splitdorf magneto, shown by the Splitdorf Laboratory, of New York, the usual high grade of Splitdorf quality is found, but the construction offers no special departure from accepted practice to need extended discussion.

Mechanical Current Generators

Aside from the high-tension magnetos described in the foregoing there were exhibited at the two shows several types of low-tension magneto generators intended to replace the batteries of the older ignition systems preserving the timers and coils used in the latter. These machines are generally driven from the engine shaft or from the flywheel through a belt or a friction pulley, and their speed has to be kept high in order that the current generated (which varies in intensity during the completion of each revolution of the magneto shaft) be always sufficient to give an intense spark when the timer is in operation.

In the Wheeler & Schebler magneto, shown by Wheeler & Schebler, of Indianapolis, and which was fitted to a number of trucks and commercial vehicles at the two shows, the armature is of a special construction giving six maximums of current intensity for each revolution of the spindle, so that it is practically impossible for the timer to skip between two maximums and cause a misfire as would be the case if the former were less frequent.

The M & S magneto, shown and sold by the Motor Accessories Co., of New York, is fitted with a centrifugal governor which allows the driving pulley to slip when the speed becomes high enough to generate a current of an intensity which might be injurious to the coil used in connection with the magneto.

In the K. W. magneto, shown by the K. W. Ignition Co., of Cleveland, Ohio, the spark coil is built up integral with the magneto itself and is fitted in the space comprised between the top of the magnets and the armature casing. This machine is driven from the engine by any desirable means and only requires the addition of a timer and a distributer positively driven through gearing in synchronism with the engine operation.

One of the main points of these current generators is that they can conveniently be fitted to any existing engine with a minimum of labor since they do not require any more positive drive than can be provided by a belt or a friction pulley.

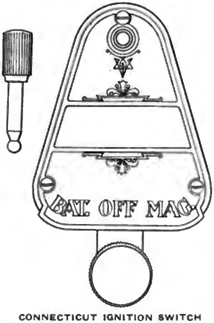
Although, to a large extent, lacking the simplicity of wiring and the compactness of the improved types of high tension magneto, these generators are a considerable improvement in machines when they can conveniently be fitted and where the installation of a high tension magneto would present difficulties. They are an insurance against the exhausting, and the frequently unexpected current shortage, of batteries.

Motor Ignition Accessories

Less prominent than they formerly were, these accessories, which in many cases have been displaced by the high-tension magneto, still show some remarkable examples of efficiency and ingenuity in design.

The Atwater-Kent spark generator, shown by the Atwater-Kent Mfg. Works, of Philadelphia, Pa., was exhibited in both the usual and the simplified "Unisparker" forms. The latter is merely the combination of the ordinary Atwater-Kent contact breaker with a single coil and a high-tension distributer. The main advantage of these devices is their economy in current consumption and the possibility of the use of practically exhausted batteries in connection with them.

For use in connection with ignition systems where both a magneto and a battery device are employed the Connecticut Telephone & Electric Co., of Meriden, Conn., has brought out a neat dashboard switch, illustrated by the accompanying outline sketch. When the plug (shown alongside the switch) is removed from the opening in the top of the switch the magneto circuit is closed and the battery circuit opened, making it impossible to start the engine. The lever showing at the bottom of the switch conveniently allows a change over from batteries to magnets or inversely with the engine running. A different internal arrangement is provided in the same casing for use in connection with those magnetos in which instead of closing the circuit it is necessary to open it to stop its operation.



CONNECTICUT IGNITION SWITCH

The L. H. Lehman Mfg. Co., of New York, showed a new type of timer, for which they claim an unusual resistance to wear. Instead of the usual roller revolving on a small diameter spindle they use a Hess-Bright annular ball bearing rolling under spring pressure against a fiber ring of the usual type. The whole device runs on a hub also fitted with annular ball bearings.

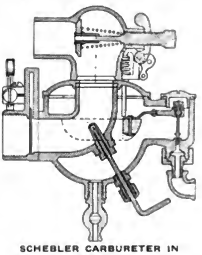
In the design of the Arkno timer is found conspicuous influence of magneto construction. This device was shown by the Arkno Mfg. Co., of Chicago, and essentially consists in a finger carrying a hard carbon brush making contact with small copper discs inserted in the face of a fiber plate—a construction so far confined to magneto distributers.

In the Velos timer and distributer a roller is used in a connection with a deeply notched cam. The roller is carried by an arm on which is mounted a platinum point which makes contact with an adjustable platinum screw when the roller rides over the high points of the cam. On the same shaft and running at the same speed as the timer is mounted a high-tension distributer consisting of a brass segment distributing the current to suitable contacts from which wires are led to the spark plugs. The timer cam is provided with as many notches as there are cylinders to be fired during one revolution of the timer shaft, and the latter runs at the same speed as the camshaft in four-cycle engines or at the speed of the crankshaft in two-cycle engines. This apparatus only requires one single coil for the ignition of any number of cylinders.

Carbureters for Gasoline Motors

One of the most important parts in connection with the operation of gasoline motors is the carbureter. So many are the problems to be considered in its design and so large is the amount of experimenting required to bring it to sufficient perfection, that many makers of commercial vehicles prefer to adopt on their machines carbureters manufactured by the several houses that make a specialty of this work.

Prominent among these is the Schebler carbureter, which was to be seen on a large number of vehicles at both shows. This device was also on view in a variety of sizes at the stand of Wheeler & Schebler, of Indianapolis, Ind. In the accompanying sectional view is shown their model "D," which they recommend for heavy work and which is mostly found on business wagons. This carbureter is fitted with an hemispherical float chamber and a centrally located jet. This makes it practically unaffected by the variations of position brought about by the operation of the vehicle to which it is fitted on inclines or hills. The float is made of cork, heavily shellaced, avoiding the trouble which often results from leaky metallic floats. An accessible needle valve is provided to adjust the size of the nozzle opening. The throttle is of the flat shutter type, and is shown closing the horizontal mixture outlet on the nozzle level in the illustration. Above the nozzle is shown the ball-shaped air-inlet elbow. The operation of the cone-seated auxiliary valve is clearly understood. The tension of the spring which retains this valve on its seat is easily adjusted by screwing in and out the valve guide and locking it in position by means of an external wing nut. The clear space seen in the illustration between the lower part of the valve and the wall of the elbow is the constant air opening which is properly proportioned to supply the air necessary for starting and for slow running.



SCHEBLER CARBURETER IN SECTION

A drain cock is fitted at the bottom of the float chamber to allow a ready means of letting out all impurities which might have accumulated in the carbureter and also for the convenient drawing of gasoline as is sometimes desirable for a variety of purposes in the operation of a gasoline vehicle.

The Stromberg carbureter, which was shown by the Stromberg Motor Devices Company, of Chicago, Ill., is conspicuous by the number of adjustments provided and the ease with which they are effected. The float chamber is provided with a glass wall which allows a ready inspection of the fuel level and of the operation of the working parts. A strainer is fitted below the float needle valve to prevent the ingress of water or of any solid matter which the fuel might contain. The mixing chamber is vertical and water jacketed in order to keep it at a uniform temperature. It is in the form of a Venturi tube, that is, it is restricted at the level of the nozzle opening to increase the air velocity at that point, but gradually tapers to normal size above and below that level.

The extra air-inlet valve is located in a side pocket, and works downward against two springs provided with separate adjustments and which add their tensions at high speed. The size of the main air opening at the bottom of the mixing chamber is adjusted by means of a dished plate which also forms a convenient cup for the overflow of gasoline when starting and which then acts as a surface carbureter for the provision of a specially rich mixture.

The Breeze carbureter, shown by the Breeze Carbureter Co., of Newark, N. J., is fitted with a single adjustment regulated by means of two external milled buttons. These are fitted with index numbers such that any lost adjustment can easily be again found after dismantling or cleaning. The regulation of the quality of the mixture is entirely obtained by the operation of the throttle, a needle valve being provided which varies the amount of gasoline issuing from the nozzle, and increases the fuel supply as the speed rises.

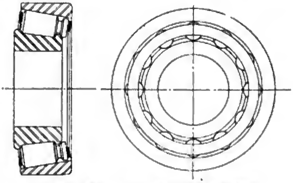
In the Kingston carbureter, shown by Byrne, Kingston & Co., of Kokomo, Ind., a central nozzle is provided in connection with an annular float chamber. The main air opening is at the bottom of the mixing chamber and the auxiliary air supply comes from a side pocket at the top of the apparatus. There is no valve or spring in the Kingston carbureter, the auxiliary air inlets are five in number, and are closed by metal balls of different weights; as the suction in the mixing chamber increases the pressure outside lifts these balls in proportion to their weight and thus gives ingress to the air. The throttle is of the butterfly type.

Keeping in view the requirements of their own motor and those of two and four cycle engines in general, the Willet Engine and Carbureter Co., of Buffalo, N. Y., have evolved an appartus which they exhibited under the name of the Willet Automatic Multiple Jet Carbureter. The apparatus practically amounts to two different carbureters united in a single casting. The smaller one provides mixture for starting and at low speeds and the larger one is only used at high speeds. The big carbureter is normally closed by a large conical-shaped automatic valve, which has a very light spring tension to control its action and which only opens in proportion to the demand of the engine for an increased supply of mixture. The tension of the spring keeping this valve down is much less than it would be for an automatic extra air valve. This results in a freer passage being offered to the gases in the carbureter.

Roller and Ball Bearings

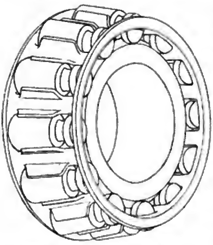
One of the greatest developments brought about by the advent of the self-propelled vehicle was the evolution to its present status of perfection of the composite anti-friction bearing. Whether of the ball or of the roller type, this bearing, which was distinctly evolved for use in transportation, is now finding its way into every branch of engineering. In commercial vehicle work the roller and the ball bearing are necessities in the most strained parts, at least, as without their use the wear, the constant renewal and the uncertainty of action of the plain bearing in rough and ready work would be a constant source of trouble and expense.

Most prominently used in commercial vehicle manufacture are the Timken roller bearings, made by the Timken Roller Bearings Axle Co., of Canton, Ohio. These bearings are of a well-known type, essentially consisting in a row of tapered rollers held in a suitable cage and working between a cone and a cup in which they are guided and kept in place without friction by circumferential ribs on the cone. The tapered shape is given to the roller to make adjustment possible, as it is evident that by varying the position of the cone in relation to that of the cup the degree of freedom of action left to the cone will vary.



TIMKEN NEW SHORT ROLLER BEARING

Timken roller bearings are almost exclusively used in the hubs of the trucks and vehicles which were exhibited at the two shows; this is due to their perfect adaptability to support radial as well as axial loads, and to their remarkable wearing qualities.

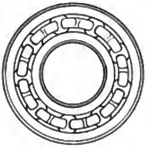


ASSEMBLY OF TIMKEN BEARING

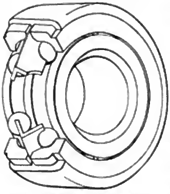
In the accompanying sketches there is illustrated a new type of bearing evolved by the Timken company to be employed where space is limited. The sectional view clearly shows the shape of the roller which is kept from longitudinal movement by the lip on the cone against which it bears at its bigger end and at the other end by a similar rib over-ridden by a groove cut in its body. The perspective view explains the mounting of the rollers on the cone and the construction of the stamped steel cage which separates the rollers and prevents friction between adjacent ones.

The use of roller bearings in the past had been considerably hindered by the impossibility of manufacturing with sufficient accuracy to secure good results. A roller bearing not absolutely accurate is utterly useless and short-lived. It appears that in the Timken bearings the problem of accurate manufacturing has been entirely solved.

In the line of ball bearings those made or imported by the Hess-Bright Mfg. Co., of Philadelphia, Pa., under the names of "H-B" or "DWF," are very widely used. They are of the annular type, consisting of balls radially disposed between two concentric rings or races in which curved grooves are cut to provide a path for the balls. In these bearings the balls are separated either by a solid bronze ring which encloses them as shown in the sketch or by coil springs and felt washers — impregnated with lubricating oil. Ball thrust bearings were also exhibited, consisting of steel washers with the balls working between them. To evidence the care with which their bearings are manufactured and tested, the exhibit of the Hess-Bright Mfg. Co. contained a number of very fine instruments of precision designed to detect any possible inaccuracy.


H-B BALL BEARING

Of a relatively new type are the New Departure bearings shown by the New Departure Mfg. Co., of Bristol, Conn. The accompanying partly sectional view clearly shows the principle on which these bearings are made. They essentially consist of a cone carrying two ball races and of two cups forming the outer ball races. The whole is kept in perfect assembly by a spun steel shell which keeps the cups in proper relation to each other. The most interesting feature of this type of bearing is that it will preserve its efficiency under any and all irregularities of load, making it equally well adapted to withstand radial or axial loads or any combination of the two.


NEW DEPARTURE BEARING

To clearly evidence this the New Departure Mfg. Co. had on exhibition at both shows a system of two 1,000-pound flywheels rotating individually in parallel planes and bodily around an axis parallel to their planes of rotation; this put the ball bearings carrying the wheels under stresses of constantly varying direction, and was an excellent demonstration of the all-around capabilities of the bearings.

The "RIV" annular bearings, shown by the R. I. V. Company, of New York, are annular bearings of the usual type. Their main characteristic is that instead of the usual type of separator they are provided with a bearing metal ring cast in one piece around the balls, which are held in position by special casting dies during assembly.

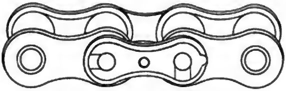
The Standard Roller Bearing Co., of Philadelphia, Pa., exhibited a very complete line of ball and roller bearings, showing the greatest eclecticism in design, and covering the widest possible range of applications.

The imported "RBF" annular ball bearings, shown by Lavalette & Co., of New York, are only made without spacers between the balls and are of a special alloy steel of an elasticity such that the balls are forced in the space between the cup and the cone without any permanent distortion of the ball races.

Driving Chains for Vehicles

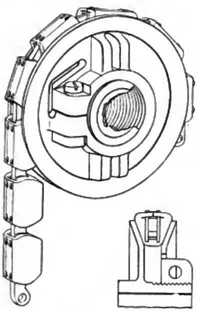
With the great predominance of the chain drive in commercial vehicle construction, the subject of chains takes a special interest. Although the proportions and sizes of these components are practically standardized, it will be interesting to note what the builder and user were offered in the chain line at the two shows.

The Diamond Chain and Manufacturing Co., of Indianapolis, Ind., exhibited a very complete line of vehicle chains in both their standard riveted type and in the detachable line. Their range extends to the largest sizes of roller chain used on commercial vehicles, and all the models are made in both styles, riveted or detachable. The detachable Diamond chain is remarkable in that it is not weakened in any point in order to obtain the desirable feature of detachability. The rivets in this chain are shouldered to take a light gauge steel plate which fits over the removable flange to hold it in place as shown in the accompanying illustration. In the center of the guard plate is a depression which snaps into a hole in the flange, thus securely holding the plate in place whatever the position of the chain may be. As there is no motion between the rivet and the guard plate, there is no wear in that part, and the construction is as durable as any riveted chain. Considering the advantages of the detachable chain in repair work, especially in case of emergencies, considering also that the price and the wearing qualities are the same as those of the riveted chain, this type commends itself very strongly to the attention of the vehicle user.


DIAMOND DETACHABLE DRIVING CHAIN

The Whitney Mfg. Co., of Hartford, Conn., also showed a very complete line of chain, ranging up to 2 inch pitch and 1-4-inch roller width. Their detachable able chain uses split pins to hold the removable flange in place on the rivets.

An interesting chain belt, intended to be used in place of the usual leather belt to drive cooling fans and other accessory devices on commercial vehicles, was shown on the Whitney stand. This chain belt is represented in the accompanying illustration. It practically consists of an ordinary small roller chain in which every link is covered with a leather facing held by a thin metal plate and four stitches. The profile of the leather covering conforms to the 28-degree angle generally adopted in the shaping of V pulley grooves. The advantages of this chain belt over the ordinary belt as regards flexibility and absence of stretching are obvious, and make it worth more than passing consideration.


WHITNEY LINK BELT FOR FANS

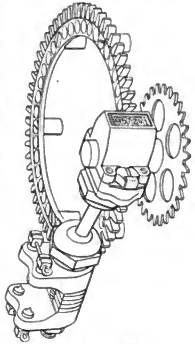
Outside of the regular Baldwin line of chains the Baldwin Chain and Manufacturing Co., of Worcester, Mass., also exhibited a new detachable chain. One of the features of the Baldwin roller chains has always been the serrated rivets which fit in correspondingly serrated or toothed holes in the flanges, to absolutely prevent their turning. This feature is preserved in the detachable chain. The removable flange in the latter type is held in place by small clips fitting in grooves cut in the studs over which they are closed by means of a pair of pincers; they are removed by springing them open with the point of a screwdriver or any similar tool.

Distance Recording Instruments

No increase in the number of concerns making distance recording instruments for the equipment of commercial vehicles was noticeable at the shows. Such instruments are absolutely necessary for the keeping of proper records of operative data, including ton-mile costs, mileage of batteries and tires, and to keep tally of the performances of drivers. A recording instrument of substantial design and accurate in its visible records should be fitted to every commercial vehicle, and no doubt in time all vehicle builders will include such instruments in the regular equipment of vehicles sold.

At both shows the Veeder Mfg. Co., of Hartford, Conn., exhibited a line of odometers for commercial vehicle equipment. These instruments are compact in form, substantial in construction and moderate in price, and have been largely adopted by truck users. One type of odometer clamps to the steering arm of the machine and is actuated through a gear wheel in mesh with a driving gear secured to the inner side of the road wheel of the truck or wagon. This gives the total mileage and, of course, the difference between readings can be easily computed to obtain the single trip mileage. Another form has two registers, showing both trip and total mileage, and is attached to the dash, the rotary motion of the road wheel being conveyed to the instrument by flexible shaft.

The Jones Speedometer, marketed in New York, was also exhibited at both shows. This instrument has a 3-inch glass-covered dial, located on the dash of the machine, and is operated by flexible shaft and suitable striking mechanism attached to one of the front wheels. The Jones Speedometer measures the distance covered, going forward or backward, and registers both total and trip mileage; the latter register is reset by a touch on the resetting stem.


VEEDER ODOMETER

The Hoffecker Co., of Boston, also displayed a dial instrument for attachment to the dash of a vehicle. Great accuracy is claimed for this register.

Another exhibit in this line was made by the Stewart & Clark Co., of Chicago, which furnishes an instrument showing the speed attained at any moment when running and also the trip and total mileage. It registers motion in either direction.

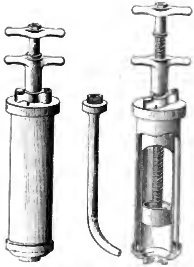
Small Tools and Equipment

Small tools and equipment were shown by several makers, and though these did not include any striking novelties, the exhibits were interesting to those who are charged with vehicle and garage equipment.

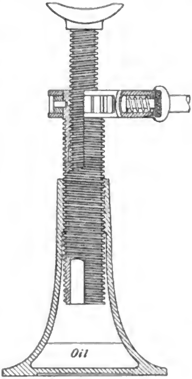
Strong steel adjustable wrenches for the tool box or shop were displayed by the Coes Wrench Co., of Worcester, Mass. The convenient "auto-cle" wrench, which was originally developed in France, was exhibited by the Frank Mossberg Co., of Attleboro, Mass. This is of the socket type with a handle fitted with a universal joint so that nuts can be turned which could not be reached at all by the ordinary jaw wrench. The auto-cle is sold in sets fitted in a wooden case. The larger size has a range from 5-16-inch hexagon to 1 9-16-inch hexagon by sixteenths and also the necessary square sockets.

The Tuckahoe grease gun, exhibited by the Rubly Mfg. Co., of Tuckahoe, N. Y., has merit in the "self-filling" feature of construction. This is obtained by having a supplementary barrel concentric with the outer tube; when about to be used the inner tube is thrust into the grease recepticle and thus filled; it is then inserted in the outer shell and locked by a sort of bayonet joint. Filling is easily accomplished and there is no likelihood of dirt getting in contact with the grease, as frequently happens with the ordinary slow-loading gun. When using grease the plunger is forced down by a screw, but if the gun is to be used for oil the half nut in which the screw works can be quickly released and the plunger operated by a straight push and pull.

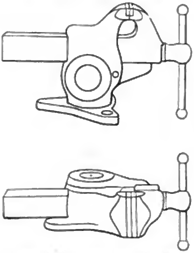
Very well made "copperized steel" pump oil cans were shown by the Noera Mfg. Co., of Waterbury, Conn. They are fitted with long spouts so as to get at otherwise inaccessible places and the amount of oil used can be regulated by the distance the thumb plunger is depressed. These cans are made in one-half and one-pint sizes and with various lengths of nozzle.



TUCKAHOE GREASE GUN



JOYCE-CRIDLAND JACK



ROCK ISLAND BENCH VISE

Motor truck jacks were exhibited by the Joyce-Cridland Co., of Dayton, Ohio. A very compact jack, shown partly in section herewith, is styled by the makers the "telescope" jack. This is fitted with a telescope screw, the inner being right-hand and the outer left, of the same pitch, and it is operated by a ratchet. In use the inner screw is turned until a bearing is had under the axle and then the outer screw is brought into play by using the ratchet, the rise of this screw causing the inner screw to lift up an equal distance for each revolution. Both of the screws are constantly lubricated by the oil chamber below. When "down" the jack is only 9 inches high, and the rise of screws is 12 inches. Its weight is 9 pounds and capacity 3 tons.

Barrett jacks for commercial vehicles were exhibited by the Duff Mfg. Co., of Pittsburg. This jack is of the rack type, operated by steel tube lever, and is fitted with a reversing trigger controlling the direction of movement, up or down. Barrett jacks are very accurately made of high-grade materials. They are made in several sizes, the largest, with a capacity of 5 tons, is 16 inches high when down, and will rise to 24 inches. Its weight is 33 pounds.

Motor vehicle jacks of 2 and 3 tons capacity of the screw type were on view at the stand of the Elite Mfg. Co., of Ashland, Ohio. This jack is known as the "Reliable." Under load the screw is raised by a threaded bevel gear turned by a lever-operated spur gear. An adjustable pawl is fitted to the operating lever so that it can be disengaged from the spur and the latter operated by a crank handle for quick return or to raise the swivel head up to the proper height to reach the load when lifting is required.

A complete line of bench vises was on view at the stand of the Rock Island Tool Co., which has supply depots in New York and Chicago. This included swivel and stationary bench vises for repair shop use, also pipe vises and a quick-acting wood-worker's vise. The universal swivel type is made in various sizes from 2 1-2 width of jaw with 2-inch opening to 4-inch jaw and 6-inch opening. Another useful type is made with self-adjusting jaws to take taper or irregular shaped pieces.

Miscellaneous Exhibits of Equipment

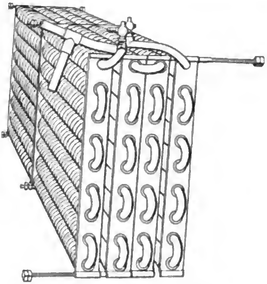
Components of electric storage batteries for commercial vehicles of the well-known "Exide" type were shown by the Electric Storage Battery Co., of Philadelphia. These were for the assemblage of the standard Exide type and also for the newer "Hycap-Exide." The latter is designed to meet the needs of users who desire a greater mileage per charge of battery than is normally obtained from the standard Exide type. The design is practically the same in both types, but the Hycap-Exide has thinner plates and consequently a larger number can be used in the same space and for about the same weight as the Exide, thus giving a greater capacity for a given weight and space although the capacity per plate is less. It is recommended for services in which the mileage per charge is in excess of that which can be obtained from the Exide battery. Taking the 13 plate "MV" Hycap-Exide as an example, the discharge in amperes for five hours is 32.4, and the weight of the complete cell is 34¼ pounds.

Elements for commercial vehicle batteries were displayed at the stand of the Philadelphia Storage Battery Co., of Philadelphia, together with a full line of batteries for other automobile purposes. The "Type W" vehicle battery cell with 17 plates has a rated discharge in amperes for four hours of 56, and the weight of the complete unit is 52 1-2 pounds.

The previously mentioned concerns also exhibited electric storage "sparking" batteries for gas motor ignition to be used in connection with induction coils. Other exhibitors of sparking storage batteries included the General Storage Battery Co., of Boonton, N. J.; Witherbee Igniter Co., of New York, and the National Battery Co., of Buffalo.

Tire chains suitable for taxicabs for use in wet or snowy weather or on "greasy" streets were exhibited by the Weed Chain Tire Grip Co., of New York. The chains fold up in small compass and can be quickly applied or detached.

Radiators for commercial vehicle gas motor cooling systems were shown by the Briscoe Mfg. Co., of Detroit, in both the cellular and tubular forms. One of the tubular type is shown in the accompanying illustration. This is made of ¾-inch round tubing with individual fins and return bends. Each row of tubes is fitted in a separate header; the ends of these headers are curled and assembled by bolts which also serve to attach the radiator to the vehicle. When the bolts and nuts are set up the radiator is securely clamped together. An important feature of this type of radiator is the ease of repair in case of accidental damage; it can be taken apart by removing the bolts, and any row of tubes taken out by loosening the solder at the return bends. Repairs can then be made by an ordinary tinsmith, at comparatively small cost.

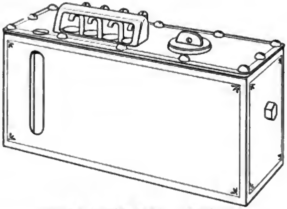

BRISCOE MOTOR TRUCK RADIATOR

Radiators of the cellular type were shown by the Livingston Radiator Co., of New York. In these a peculiar arrangement of the water-carrying tubes is used, giving a large cooling surface within the ordinary fixed dimensions of height and width, and for them very high efficiency is claimed. The company builds truck radiators of any shape to order.

The Royal Equipment Co., of Bridgeport, Conn., exhibited their well-known "Raybertos" friction facing, which is composed of asbestos fabric interwoven with copper wire and is thus unburnable under any heat conditions.

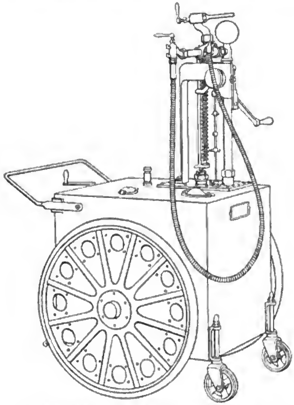
The Trenton Rubber Mfg. Co., of Trenton, N. J., exhibited their "Thermoid" brake lining composed of rubber, twine and copper fabric, vulcanized to stand a very high degree of heat and possessed of a considerable coefficient of friction.

Force feed lubricators for the positive oiling of motor vehicles were displayed by the McCord Mfg. Co., of Chicago. The accompanying sketch shows the general exterior form which encloses the pumping mechanism. This is operated by either rotary or ratchet drive from the gas motor. A glass gauge shows at a glance the amount of oil in the reservoir of the lubricator and there are sight feeds on top showing the rapidity with which the oil is pumped to each lead. These can be adjusted separately. The lubricator is, of course, automatic in its action, starting and stopping the flow of oil coincidently with the starting and stopping of the motor, and also increasing or diminishing the flow of oil as the speed of the motor is raised or lowered. No spring, needle, or complicated valves are used, but simply a steel ball check which always seats itself accurately.


McCORD FORCE FEED LUBRICATOR

Mechanical oilers with micrometer adjustment of the feeds were exhibited by the Lavigne Mfg. Co., of Detroit. These are of the usual box form, containing the working parts of the oil pumps, and can be located at some readily inspected place on the dash or under the hood, where drive from the motor is obtainable. By the use of this mechanical system of oiling, the cleanliness of the lubricant is constantly insured, as compared with the circulation method of oiling whereby the same oil is used over and over again with the attendant possibilities of abrasive material getting mingled with it and also the steady diminution in lubricating quality. The "micrometer" feature refers to an arrangement of the oil pump plungers by which the stroke can be varied by minute degrees, with corresponding changes in the amount of oil delivered.

In a large collection of gasoline and oil storage tanks at the stand of S. F. Bowser & Co., of Fort Wayne, Ind., the portable fuel tank shown in the accompanying sketch was an interesting feature for the commercial vehicle user. In the operation of heavy vehicles it is often very inconvenient to be obliged to move loaded or empty wagons to some fixed source of fuel supply, and at the same time the handling of gasoline in open vessels is highly undesirable—from an insurance standpoint especially. The apparatus shown avoids all such troubles. The portable tank has capacity to fill the fuel tanks of a large number of vehicles, and it can be wheeled alongside a machine and the filling nozzle inserted in the vehicle tank opening. A cock on the nozzle enables the operator to instantly stop the flow and prevent spilling. The tank is fitted with a pump which can be set to deliver gallons or less at each stroke, the pump being operated by rotary motion. If desired, the portable tank can be fitted with a triplicate autograph register for keeping a record of fuel supplied to each vehicle. It is fitted with indestructible steel wheels and rubber cushion tires, and there is nothing about it to catch fire.



BOWSER PORTABLE GASOLINE TANK

Fuel tanks for attachment to commercial vehicles were exhibited by Janney, Steinmetz & Co., of Philadelphia. These are made in various diameters up to 16 inches, and lengths up to 60 inches. They are made of seamless steel, tinned inside, and are very strong and durable.

Lubricants, Fluid, Semi-Fluid and Solid

To the user of motor vehicles the question of lubrication is a very important one and especially so to the user of power trucks and wagons, the mileage of which is, as a rule, very much greater than pleasure vehicles. In too many instances the purchasers of commercial vehicles have paid practically no attention to the kind of lubricants employed, frequently using the same machine or engine oil that is used for lubricating stationary machinery on their own premises. Of late, however, users have begun to realize the importance of using suitable lubricants, finding that the efficiency of the vehicles when in operation and the maintenance costs and depreciation are very closely linked to the methods of lubrication. This appreciation has been coincident with a better understanding of the requirements of work vehicle users on the part of the makers of lubricants, and now several concerns are giving special attention to motor truck and wagon oils and greases. At the New York shows there were a number of exhibitors of lubricants, some of whom have given special attention to the commercial vehicle trade.

At the stand of the Vacuum Oil Co., of Rochester, N. Y., the results of a special study of heavy vehicle lubricants were at the disposal of visitors. This company has made an extensive investigation of the types of motors and transmission mechanism used by a large number of the leading truck and wagon builders and is prepared to supply oils and greases that are suitable for the particular service demanded. The lubricants differ for the use of air-cooled and water-cooled motors, and frequently with the various methods of mechanical or splash lubrication employed by different builders. To the user of, say, a single light vehicle, who might be likely to purchase oil in cans, the new method of sealing cans adopted by this company to prevent refilling without the knowledge of the customer was interesting.

At the stand of the A. W. Harris Oil Co., of Providence, R. I., there was a display of oils in action, as it were, by means of an apparatus showing the easy flowing qualities of the oil at room temperatures and the operation of sight feeds. This maker has developed a number of formulas for the preparation of heavy vehicle oils and gives special attention to the requirements of motor truck and wagon users. A semi-solid oil for lubricating use in gear cases called "Trans-Compound" was shown as well as greases, some with graphite admixture. The oils of this old-established house are sold under the registered name "Harris."

At the stand of the Havoline Oil Co., of New York, filtration samples were on exhibition showing the gradual elimination of the tarry matter during the process of refinement. The oils sold by this house are refined from Pennsylvania crude petroleum. A medium-bodied oil for specially cold weather was shown which is guaranteed to remain fluid at 5 degrees above zero. Gear compounds and greases were also exhibited.

Geo. A. Haws, of New York, exhibited samples of the "Panhard" oils, gear case compounds and greases. One of the brands of oil shown was especially prepared for motor truck use. "Non-Fluid Oils" were on view at the stand of the New York & New Jersey Lubricant Co., of New York. These, as the name indicates, do not flow like ordinary oils and yet are not stiff like greases. It is claimed for them that as they do not spatter or drip, they are more economical in service than more liquid lubricants. They were shown in a variety of grades, one having a melting point of 488 degrees F. for use in bearings or gears located in hot places.

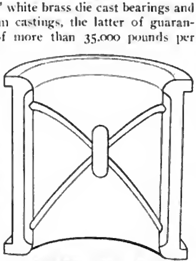
"Keystone" greases were exhibited by the Keystone Lubricating Co., of Philadelphia. These are made out of pure petroleum and guaranteed to contain no filler, such as talc, resin or beeswax. Being made of petroleum, exclusively, they do not contain free fatty acids, which are likely to have a corrosive effect on bearings. The Keystone grease will not become an oil in a temperature of 300 degrees F. "Albany Grease" in several consistencies, having atmospheric melting points ranging from 50 to 175 degrees F., were exhibited by Adam Cook's Sons, of New York.

Dixon's graphite lubricants for motor vehicles were shown by the Joseph Dixon Crucible Co., of Jersey City. One of particular interest was the motor chain compound put up in oblong cakes each weighing 3 pounds. These are melted and the chain thoroughly lubricated by being dipped. The importance of proper chain lubrication is coming to be recognized by commercial vehicle users.

Various Castings and Forgings

Steel, iron and composition castings and also forgings of interest especially to builders of commercial vehicles were displayed by several manufacturers at both shows and covered a wide range of uses. The advancement in the production of reliable steel castings was specially noticeable in the apparently sound and exceedingly well-formed samples exhibited, of such merit in these particulars that at first sight one would suppose that they were specimens of malleable cast iron. The progress that has also been made in die cast small parts, such as bearings, steering wheel spiders and the like, was indicated by some beautiful specimens of exact work. In commercial vehicle construction, where durability and interchangeability are prime considerations, the developments referred to are of special importance.

Engine bases, levers, gear cases and truss frames for trucks, cast from Parsons' manganese bronze were displayed by the William Cramp & Sons Ship & Engine Building Co., of Philadelphia. Parsons' white brass bushing castings, which are extensively used for motor vehicle engine bearings, were also shown. The Wetherill Finished Castings Co., of Philadelphia, exhibited several samples of Parsons' white brass die cast bearings and also Wetherill aluminum castings, the latter of guaranteed tensile strength of more than 35,000 pounds per square inch. The specific gravity is about 3.5. A great advantage of the die cast bearing is its comparative cheapness owing to the elimination of machining. In making repairs, too, new bushings can be substituted for old ones, insuring the correct alignment of shafts, which cannot be secured by the use of machined bearings unless by the most careful shop work.



WETHERILL DIE CASTING

Specimens of "Tubal" manganese bronze castings were exhibited by Paul S. Reeves & Son, of Philadelphia, makers of all kinds of composition metal castings. At the stand of the Light Mfg. & Foundry Co., of Pottstown, Pa., a number of large aluminum castings for motor construction were shown, together with samples of "plastic bronze" bearing metals and manganese and phosphor bronze castings.

Cylinder castings for power vehicle motors of a very fine quality, to the eye quite as good as any "made in France," were exhibited by Manufacturers' Foundry Co., of Waterbury, Conn., and by the Erie Foundry Co., of Erie, Pa.

An infinite variety of component parts made by the steel casting process was on view at the exhibit of Isaac G. Johnson & Co., of Spuyten Duyvil, N. Y., including even crankshafts and change speed gears. The tensile strength of the specimens shown ranged from 80,000 to 85,000 pounds per square inch and the elongation 15 to 18 per cent. In chrome nickel components this company states it gets much higher results after treatment; running to 104,000 pounds tensile strength and above 85,000 elastic limit, with excellent elongation and reduction of area results.

The Lebanon Steel Casting Co., of Lebanon, Pa., showed a great variety of crucible steel castings, including many of irregular shape, such as housings for rear live axle gearing. These castings can be alloyed with nickel, manganese, vanadium or other metals. Samples shown varied in tensile strength from 70,000 to 120,000 pounds, the percentages of elongation and reduction in area varying according to the carbon content, which may run from .20 to any amount desired.

Shelby seamless cold-drawn steel tubing in a variety of sizes was exhibited by the National Tube Co., of Pittsburg, Pa. The inside and outside diameters of this tubing are very true to size, the former seldom varying more than from .005 to .010 of an inch from the true diameter. It is furnished in three different anneals—hard, medium and soft—according to the particular use to which it is to be put. The usual length is 5 feet. The company also furnishes 3 1-2 per cent. nickel-steel tubing.

Crankshafts for motor vehicle engines were shown by the Anderson Forge & Machine Co., of Detroit, both in the rough and finished to size. The grade of steel used by this company contains from 30 to 40 per cent. of carbon in combination with manganese and other elements to secure a tough, strong texture. The finished shafts sent out in the ordinary course of business are ground in the bearings to secure an accuracy of within one-thousandth of an inch of the specifications. Samples of drop forgings were also on view.

Thomas Prosser & Son, of New York, exhibited specimens of Krupp steel, especially the chrome nickel-steel grade, which can be used unhardened, or case hardened, or hardened in oil with a consequent large increase in the elastic limit and tensile strength of the material. Unhardened this steel has an elastic limit of 95,000 pounds, minimum tensile strength of 110,000 pounds and elongation of 16 per cent.

Although not directly coming under the head of castings and forgings, the autogenous welding process developed in this country and exhibited by the Davis Bournonville Co., of New York, is so closely connected to these parts that it should be of more than passing interest.

The exhibit of the apparatus employed and of some samples of the work done attracted considerable attention and showed the wide range of usefulness of the process in manufacturing as well as in repair work.

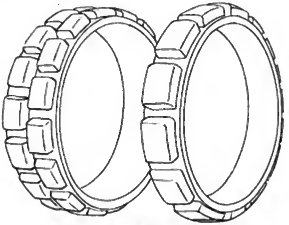
The principle of the process resides in the utilization of the very high flame temperature of an acetylene and oxygen blow-pipe to unite metals by melting at the point of contact. All the metals in common use in vehicle construction can be operated upon, including cast iron.

In manufacturing the process makes possible the economical production of very intricate pieces by the welding together of forgings or sheet metal stampings, even if different metals are embodied in a single piece.

COMMERCIAL VEHICLE TIRES AT THE SHOWS

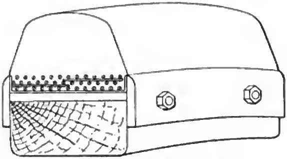
THE commercial vehicle tire display at both the Palace and Garden shows this year while not remarkable for any great general change in methods of fastening, brought forward a number of new features and a much larger variety of sizes in the display.

The Consolidated Rubber Tire Co., New York, exhibited one large endless truck tire with their regular style of side bolted flange, but the new sectional block tires proved the drawing card and caused almost as much discussion at the various truck sections, where they were displayed, as the truck exhibits themselves. Several sample blocks were shown, which, after ten months use on a 5-ton truck with trailer, exhibited no signs of wear at the base. This is the "Kelly-Springfield" tire.



KELLY-SPRINGFIELD BLOCK TIRES

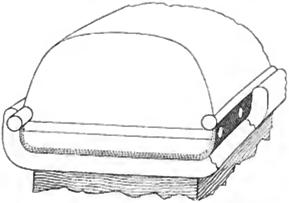
Diamond Rubber Co., Akron, O., brought forward a new truck tire in addition to the well known product of the past few years which was displayed in various sizes. The new tire is known as "Solid Cushion,' the cross wires in the base of this tire are of much larger size and more space is allowed between them, and the entire tire is moulded from one compound.



SECTION OF DIAMOND TIRE

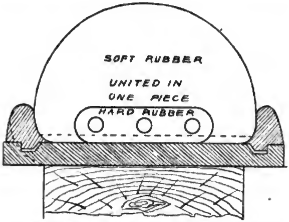
Dayton Rubber Mfg. Co., Dayton, O., a new exhibitor in the field with an airless cushion tire suitable for taxicabs and motor delivery wagons. In outward appearance it resembles a pneumatic and will fit on any form of clincher rim.

Firestone Tire & Rubber Co., Akron, O., had one of the largest displays in shows, of their well known side wire truck tires ranging from 2 to 7-inch sizes and including dual tread non-skid forms. Among the latest devices was shown a detachable truck tire and rim consisting of four parts: channel rim, locking ring, demountable rim with side wire tire, and side clamping plate. It is very simple in construction, has no sharp angular parts to rust and requires only an ordinary wrench to operate. Attention was attracted by a 36-inch by 3 1-2-inch truck tire which had been removed from a one-ton truck owned by August Geyert, of Greensburg, Ind. This tire has been in use about four years and in that time traveled 25,521 miles, wearing down to the channels without injury to the base.



FIRESTONE SOLID TIRE CONSTRUCTION

Goodyear Tire & Rubber Co., Akron, O., exhibited for the first time their new truck tires in which the circumferential retaining wires are moulded into a hard rubber base which is united to the soft rubber forming the body of the tire. Cross cleats fitting into slots in the rim and under side of the tire prevent creeping, and by the aid of a riveted side flange replacement is made an easy matter. A wheel removed from one of the Fifth avenue 'buses was displayed showing a Goodyear tire which—up to December 31—had run a distance of 14,010 miles and was in excellent condition.



CROSS-SECTION OF GOODYEAR TIRE AND RIM

Hartford Rubber Works Co., Hartford, Conn., had on view two large twin truck tires with their patent removable side rim. The shape of the tire has been changed this year and is no longer of the V-shaped base type which had a tendency to buckle when side pressure was applied. The new tire does not allow dirt to collect in the channel and the retaining wires moulded into the base are further held together by an interlacing of fabric.

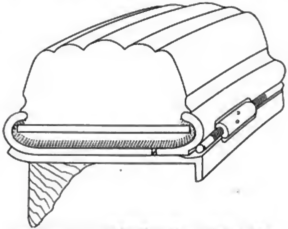
Lockport Rubber Works, Lockport, N. Y.—While this company had no stand at the shows, the three-ton American truck displayed at the Palace show was equipped with the new Palmer patent section rubber tire made by this company. This tire is built up from rubber rings with holes moulded in the base to receive cross wires; the ends of the latter fit into elliptic slots in the flanges and between the rubber rings, circumferential wires fit over the cross wires; the idea being to firmly hold the rings in position, but at the same time allow of some play in the cross wires under the rolling strain.

Merchant & Evans, Philadelphia, Pa., introduced a patent sectional rubber tire on a steel wheel intended for a 5-ton truck. The rubber blocks which form the tire are about 2 by 7 inches in face and are placed end to end with thin steel separators between them at the sides, as many rows being used as necessary to fill the width of the channel; the sides of the steel separators as well as the channels are corrugated so that when the side channel is bolted on and compressed, the pressure holds the rings formed by the rubber sections in position.

Morgan & Wright, Detroit, Mich., show no change in methods of retaining tires, but have made improvement in the compounds used. Two 36-inch by 3 1-2-inch samples were displayed.

Motz Clincher Tire & Rubber Co., Akron, O., besides showing a line of cushion and solid commercial motor vehicle tires of their standard make, put forward a new type with extra deep concave tread with large scolloped surface, which greatly increases the resiliency, opposes skidding and more readily enables the wheel to climb out of car tracks.

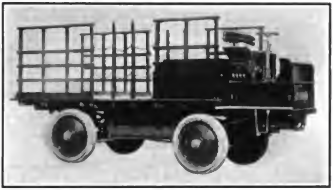
Swinehart Clincher Tire & Rubber Co., Akron, Ohio, had one of the most extensive displays of tires of their standard makes and sizes, including the cellular form which is particularly adapted to taxicabs and motor delivery wagons. Much interest was displayed in the demountable rim used on all forms of truck tires this year, and a new spare wheel for taxicabs was shown which can be quickly attached to any clincher rim by the use of six bolts, a wrench being the only tool required. During the last few days of the Garden show a 36 by 4-inch dual tire was exhibited with 8 by 4-inch rubber blocks attached to the regular demountable rim with steel separators clamping the ends of the blocks.



SECTION OF SWINEHART DETACHABLE TIRE

COUPLE GEAR MIXED SYSTEM TRUCK

The problem of connecting the advantages of the electric drive and of the explosion motor has long been a tempting one with automobile engineers, especially in the commercial field. A newcomer to this mixed system is the Couple-Gear Freight Wheel Company, of Grand Rapids, Mich. The driving system of the electric trucks of this make is well known to our readers, consisting in having an electric motor within each wheel driving, from both ends of the armature shaft, level gear crowns bolted to the rims. This system has been one of the most successful when applied to vehicles driven and steered from all four wheels. Realizing that in some services the mileage limitations of the storage battery were a hindrance to the use of their product the makers of these trucks have increased their line by the production of the machine which we illustrate.



COUPLE GEAR MIXED SYSTEM 5-TON TRUCK

In this vehicle the battery box also contains a generating dynamo the current from which can be utilized to drive the motors in the wheels, in connection with or in place of the battery current. This generator is driven, through a universally jointed shaft, by a four cylinder vertical gas motor 5 by 6 inches bore and stroke. The engine is in the usual location under the seat and footboards and is of standard construction. The normal speed is low to insure long life and remains around 750 revolutions per minute although it can be increased to 1,000. This elasticity of the gasoline engine together with the use of the ordinary electrical controller gives the truck a wide range of speeds up to 10 miles per hour. Of course, the capacity without recharging is only limited by the fuel supply. The normal load is 5 tons.

The entire power equipment is suspended from the main frame of the vehicle, the only connection to the rear wheels being that made by the flexible wires conveying the current to the motors.

The Couple-Gear construction eliminates all such parts as reverse gears, sprockets, chains, countershafts and change speed gears, all the variations in speed being obtained by the controller and the drive being transmitted direct to the rims from the motors encased and fully protected in the steel webbed wheels.

The Commercial Vehicle

Vol. IV February 1909 No. 2

Published Monthly by The Commercial Vehicle, Incorporated, at
1402 Broadway, New York City

Cable Address
Comveh, New York

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425 38th Street, New York

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Chicago, Ill.

Subscription Rates

United States, Canada and Mexico . . . . One Year $2.00
Other Countries in Postal Union . . . . One Year $3.00

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Entered as second-class matter, September 13, 1906, at the post office, New York, N. Y., under the Act of Congress of March 3, 1879.

EXHIBITS AT NEW YORK SHOWS

We have devoted the greater part of this issue to a report of the exhibits of interest to commercial vehicle users and makers at the recent New York shows. Not that the shows were at all completely representative of the commercial vehicle industry in its state of development to-day; they were, however, indicative of the very rapid progress which the industry is making and gave the prospective purchaser an opportunity to see collectively the product of many widely scattered workshops. More than anything else these shows pointed out the necessity for an independent commercial vehicle exhibition, such as was held in Chicago a year ago. That first show, although suffering from the disadvantage of being housed in a rather out of the way building and lacking in the support of many representative work vehicle builders, was nevertheless a success. It presented to the buyer a condition of cohesion among the makers which is one of the essentials in creating public confidence or in fact establishing an industry. From the commercial, logical and technical viewpoints the Chicago show should be followed this year by an exhibition of a similar character, which, if held under proper auspices and so meriting the support of all the builders, could be made a striking manifestation of the year's development.

It is generally conceded that New York is the proper location for such an exhibition, as the great metropolitan center of the country and the largest market for sales. Unfortunately there are many practical difficulties in the way, chief among which is the lack of a suitable exhibition building in any central location. If it were the consensus of opinion that a show this year would be impracticable there certainly should be some concerted action taken toward the holding of a series of public demonstrations or trials that would widely advertise the development of the industry.

Owing to the space occupied by the extensive show reports, which will be particularly valuable for reference during the coming year, we have been obliged to hold over a number of important articles for later publication.

QUESTION OF COMPARATIVE COST.

Everywhere the manufacturer and salesman in commercial vehicle lines is confronted with the question of comparative cost of the motor vehicle and the horse drawn wagon. Does the average owner of a stable know how impossible of answer his question may be? It is recognized that the average team owner is unable to say himself just what his horse vehicle has cost him in the last year! Recognizing only that he cannot do without some such vehicle and investing in the horse largely because his competitors have always used the horse wagon, he decides that when he has used the horse vehicle as economically as possible, he has done all there is to be done.

But on the instant that someone suggests the commercial vehicle as a substitute for the horse, this horse owner rises to the question of the comparative cost.

What was that original circumstance under which thousands of grocers and dry goods dealers and market men generally first invested in horse wagons? They were forced into it, simply because one dealer in a certain competitive zone decided that he would make a bid for trade by establishing a FREE DELIVERY! It wasn't CHEAPER for the other six or eight houses to invest in horses and wagons. Either they had to do so or go out of business.

When values of city real estate made it necessary to build office buildings higher than ever was dreamed of by the architect of fifty years ago, the passenger elevator equalized rental values from the roof of such buildings down. As these buildings have gone higher in the last few years the operation of express elevators that do not stop below a tenth floor have gone still further to maintain the desirability of those floors which simply could not be reached by walking.

But long ago the manufacturer of elevators was spared any possible question as to whether a bank of elevators would "be cheaper than stairs!" No; they are tremendously more expensive in first cost, to say nothing of operation and maintenance. But live competition has made the elevator in the office building a necessity; men no longer think of putting up an office building without accepting the cost of the elevator service as a matter of course.

In the great metropolitan newspaper offices of the country it is an accepted thing that $10,000 or more be invested in typewriters for the reportorial staff and editorial writers on a single paper. These standard machines at $100 each are not CHEAPER than lead pencils at $2 a gross! Ribbons for these machines will cost far more than pencils, to say nothing of repairs and the employment of an expert machinist to keep the machines in order. But it has been discovered that when all the circumstances of newspaper making are considered, the modern newspaper cannot do without the typewriting machines. As mere time savers they have become necessities whose cost cannot enter into the calculation at all.

Back of almost every great innovation in the material world of business one discovers inevitably that the time element has figured as the one instigating cause producing the change. As city boundaries spread and as centralized markets continue to grow in popularity, will the sentimental or unprogressive horse owner dare venture to say how much longer he will DARE to question whether he can run a commercial vehicle cheaper than he has been running his horse truck? To-day he can light his show windows with the old gas burner of a quarter of a century ago and it will be far cheaper. But year after year electric novelties for window lighting are increasing in energy-consumption and cost with no reverting question on the part of the merchant as to whether the old gas jet might be cheaper.

To-day, with appreciation of the commercial vehicle and all its strategic value as applied to an active business, the question which might be asked by thousands is, not whether the motor truck is cheaper than the one horse wagon. The question would better be, "Is it cheaper than three or four horse trucks?"

The trouble with the average inquiring merchant is that he refuses to consider that he has a transportation problem of his own to solve. If his place of business be in the center of a large city, he is pleased to recognize that an Interstate Commerce Commission is dealing with the railroads that reach to his warehouse; he is interested that some city council commission is working to the end that his hundreds or thousands of employees may get to and from their work cheaply and expeditiously. But he fails to recognize that in clinging to the archaic horse vehicle, he simply is sitting back in the attitude of declaring that all question as to transportation methods and problems ends at his own warehouse, where in truth the most vital principles of transportation are at stake.

THE TEAM-OWNER'S POSE

We have referred to the necessity of a humane society in the business of the team owner. We have pointed out how essential that organization is in the conduct of the team-owner's own selfish business. As an agent of mercy, self-supporting, in order that the team-owner might profit from its good offices, we have been disposed to sneer at the frequent posings of the team-owner who would have us believe that it is his love and respect for the faithful horse which chain him to medievalism.

But in these past references to the humane society we have been disposed to look upon its work as an agent acting through intangible moral agencies to compel the horse-driver to treat his dumb servitor decently. Not for a moment had we considered that the humane society might be so pressed by the horse-loving team-owner as to force the society to provide a literal horse power, free, in forcing the horse-loving team-owner to allow the society to bolster up his posings. But we have the proof of the condition in an editorial from a recent issue of *The Chicago Tribune*. It isn't pleasant reading for the horse-loving team-owner, we should think, but it is far nearer truth than any posings possibly could be, for which reason we reproduce the editorial in full:

> "The Illinois Humane Society has stationed an attendant with a helper horse at the Michigan Avenue incline of the Rush Street bridge. The idea is to afford relief to teams trying to pull overloaded wagons up the grade. That reflects credit upon the Humane Society. Incidentally, it operates as a constant criticism of owners and drivers who permit overloading in the season when the roads are harder to travel.
>
> "The first blanket of snow on the streets and the cold weather combined with it are followed by sights that are painful to witness. Horses fall everywhere. Some of them are hitched to wagons bearing the names of prominent firms. Others as plainly come from the stables where animal comforts are wanting. But, no matter what their ownership, unless they are rough shod they are liable to fall under the conditions which prevail in Chicago from now on.
>
> "A horse may stumble on four feet" is an old saying in many languages. It is literally true in Chicago. The Humane Society's helper at the Rush Street bridge may prove a silent but effective suggestion to many. To overload wagons when the footing is insecure and to neglect the horses' shoes are two faults which closely approach criminality. In both of these respects, however, a good many Chicago horse owners fail to recall what was said long ago about "the merciful man."

We may add, only, that the Rush Street bridge is only one of scores of Chicago bridges where the society might station helpers with horses. Will the horse-loving team-owner in Chicago wait for this action on the part of the society? To repeat *The Tribune's* observation, "The Humane Society's helper at the Rush Street bridge may prove a silent but effective suggestion to many." It may—yes. But, frankly—with some knowledge of the posings of the man who loves the horse so much that he must drive him to heavy loads in city streets—we doubt it!

* * *

A uniform motor legislation bill which is actively being considered by nine eastern States contains a number of clauses which will materially help to improve the legal standing of the motor vehicle.

One clause of this bill is, however, not in accordance with its otherwise liberal spirit and calls for attention here. It refers to "motor vehicles used solely for commercial purposes" and to "electric machines used solely within the confines of a city." This clause provides for an annual registration fee of five dollars for each vehicle, irrespective of size or power.

There is not in the proposed bill any justification for this clause which can only be considered as a tax on enterprise.

The commercial vehicle is not like the pleasure car, a luxury, and cannot be taxed as such; it also is not like the UNTAXED horse, a public nuisance.

The commercial vehicle assists in relieving traffic congestion; its slowly revolving rubber-tired wheels do not disintegrate the road surface as do the narrow steel tires of horse carts or the fast running pneumatic tires of automobiles; it does not keep an army of "white wings" constantly busy removing its germ-conveying refuse; it does not upset the sanitary conditions of entire districts by the presence of offensive stables and the transportation of manure.

The commercial vehicle distinctly is less of a burden to cities than the UNTAXED horse and there is no just reason why it should be made to pay for damages and inconveniences freely brought about by its obsolete competitor.

TENDENCIES OBSERVED AT THE PARIS TRUCK SHOW

HENRI GODEFROY

PARIS, FRANCE.—After a successful year for the commercial vehicle industry in Europe, the Paris Poids Lourds Salon, which closed its doors on New Year's eve, was one of the greatest and most representative exhibitions of strictly business wagons probably ever held.

For the first time the ponderous truck and the busy van were allowed to hold their interest in the world renowned Grand Palais. Up to the present the commercial vehicle show had always been held as an adjunct to the pleasure car show and it was not deemed proper to introduce in the fanciful and luxurious scheme of decoration of the latter the serious note which the presence of the utilitarian vehicle would have brought in. The consequence was that up to the present, the trucks, 'buses, vans and similar machines were relegated to other buildings, generally of a temporary character in the vicinity of the Grand Palais where the pleasure car reigned supreme.

For the last show the growth of the industry and the importance and number of the makers desiring to exhibit was such that the previous policy could not be continued. The cost of putting up a sufficiently large building would have been prohibitive, and besides holding the commercial vehicle show on a basis inferior to that of the pleasure show would have been putting the former under the light of a side issue of the latter. The result was that a separate show was held a few days after, and on the same premises as the pleasure car Salon.

In order to increase the gate profits the organizers created an attraction for the mass of the public by adding to the commercial exhibits a section of aeroplanes and dirigible balloons in which considerable interest is taken in France; this, however, in no way detracted from the importance of the vehicle section where the attendance always was large and of a generally interested class.

As regards the general character of the show, gas motor-driven machines were in the overwhelming majority.

Owing to the economical conditions prevailing in France and in continental Europe the electric vehicle never had in this country the wide popularity which it enjoys in America and machines of this type were extremely few at the Salon.

Steam was only represented by Chaboche and S. A. G. E., the latter of which is a relatively new concern. The absence of the two leaders of the steam movement in France, namely Serpollet and Purrey, was most noticeable.

Producer gas which for a time seemed likely to become an important factor in heavy transportation has failed to occupy the position which it was expected to take. The consensus of opinion is that its application although still promising has not yet reached a sufficiently advanced degree of adaptability to work under other than specially skilled supervision.

The field thus practically remains to the hydrocarbon engine. One of the most striking features of the Salon was the evidence of special efforts being made to use fuels other than gasoline. The price of gasoline is very high in most European countries and especially in certain towns where heavy taxes are put on its sale. In order to reduce operating costs considerable efforts are being made to secure equally good results by the use of other fuels of a lesser cost. Kerosene, alcohol, benzol and naphthalene are mostly used. Benzol and alcohol, or a mixture of the two are widely used, a large number of taxicabs and omnibuses running on these fuels being shown. The basic patents on the devices permitting the use of naphthalene being between the hands of two associated parties the latter is only shown on vehicles whose makers accepted to pay for license rights, it nevertheless is one of the best promising fuels from a standpoint of economy.

The Aries company exhibited a kerosene carbureter, but the general opinion of the other exhibitors who more or less all experimented with this fuel is that it is most difficult to evolve satisfactory apparatus for its use. In short the results obtained with gasoline would preclude any researches along different lines were it not for the cost considerations which brought about the movement generally considered as the prominent feature of the show.

In construction itself the power of the motors used is generally lower than heretofore for a given weight capacity. The five-ton chassis are fitted with engines averaging twenty-four horsepower while fifteen generally is deemed sufficient for three-ton vehicles.

There is a distinct return to the employment of engine governors. These devices have been abandoned on the majority of pleasure cars and many commercial vehicle builders had too hastily followed the movement. The problem of goods transportation is however entirely different and governors are claimed to be of distinct benefit. In some cases the governor construction and operation is most elaborate, as for instance in the case of the latest Saurer vehicles. In these the governor is so interconnected with the control apparatus that on the high gear the motor cannot be speeded up to more than half of its maximum speed, while on the three other gears the governor acts in the customary manner. This construction is distinctly intended to prevent reckless driving of the machine.

One of the notable tendencies in engine design is the adoption of longer strokes in relation to the cylinder bore. Strokes one and a half times the bore are the majority, but the proportion is still higher in many cases. The Delahaye trucks are fitted with two sizes of motors according to the load and the speed required. One is a twenty horsepower approximately 3 5-8 inch bore by 6 1-2 inch stroke and the other a thirty horsepower 4 inch bore by 7 inch stroke. These motors are the extreme cases of a generally accepted practice. In every case it is striven to produce a motor which will be held in check as to speed by the governor in ordinary easy service and which will keep up a practically constant speed when the pull required will be greater. The object is to keep the average commercial speed of the vehicle as high as possible without figuring upon reckless outbursts to make up for slow work in difficult places.

Ignition universally is by high tension magneto, the Bosch and the Eisemann being by far the most widely employed. The preference is given to fixed point ignition systems, that is to systems in which no spark advance lever is provided. The hand actuated throttle is also often suppressed, and the latest practice is to merely fit a foot accelerator as only means of controlling the engine speed.

For the lower powers the four cylinder engine is not considered necessary and the majority of engines below 15 horsepower are fitted with two vertical cylinders except when special comfort is required for passenger transportation.

The demand for minimum power has prompted the creation of several models up to 1,500 pound capacity fitted with engines of not more than 8 horsepower employed in connection with transmitting mechanisms of considerable efficiency exclusively mounted on ball-bearings in order to save as much of the available power as possible.

The double side chain drive has made further progress in displacing the pinion and internal gear drive which had in the past been prominent in imitation of the De Dion heavy chassis. In fact the chain is practically universal above two ton load capacity.

Panhard and a few other prominent makers are substituting slides for the shackle construction up to the present used in spring design.

Pneumatic tires of the dual or treble types are frequently fitted on vehicles up to three tons capacity for town service. This is to a great extent due to the large number of cobble stone paved streets encountered in European cities on which other tires are not always sufficiently resilient to avoid excessive vibration.

AUTO ENGINEERS HOLD WELL ATTENDED MEETINGS

MEMBERS of the Society of Automobile Engineers convened in New York for their fourth annual meeting, which was held in two sessions on January 5 and 19. Each of these sessions corresponded with one of the automobile shows, the object being to give members coming to New York on these occasions an opportunity to avail themselves of their presence in this city to attend the meetings.

Each session occupied a complete day. In the morning demonstrations were given of the Automobile Club of America's dynamometer to measure the power output at the wheels of motor cars. The afternoon was occupied by the discussion of the various papers contributed by members, after which a dinner was held on each occasion.

The afternoon meeting and the dinner took place at the Automobile Club on January 5, and on January 19 the discussion took place in the Engineering Societies Building, on Thirty-ninth street, and the dinner at the Engineers' Club adjoining on Fortieth street.

A large number of members attended both meetings, many having specially come to New York to avail themselves of the opportunity to examine the club's dynamometer. Among those present were numerous representatives of the commercial vehicle industry.

At the January 5 meeting the following officers were elected for the coming year: President, Henry Hess, Hess-Bright Manufacturing Co., Philadelphia; First Vice-President, Russell Huff, chief engineer of the Packard Motor Car Co., Detroit; Second Vice-President, B. D. Gray, chief engineer of the American Locomotive Company, Providence; Treasurer, Allan H. Whiting, New York; Managers for the term of three years to fill the vacancies expiring at the meeting: David Fergusson,

ABSORPTION AND INDICATING DYNAMOMETER FOR AUTOMOBILES
100 HP
BE
YOUR

GROUP OF MEMBERS OF S. A. E. IN TESTING LABORATORY OF THE A. C. A. IN NEW YORK chief engineer of the George N. Pierce Co., Buffalo, and Prof. R. C. Carpenter of Cornell University.

The afternoon session of January 5 was opened by the reading of the reports of the various committees. Among other progress they showed the membership of the Society to have increased from 116 at the close of 1907 to 280 at the close of the past year, and the income for 1908 to have been close to $8,000, whereas for 1907 it had been less than $1,500. The Society thus showed a most prosperous condition.

In the discussion of the technical papers presented great activity was evidenced. On January 5 papers were read on: "The Modern Trend of Brake Design," by Lawrence Whitcombe and Thomas J. Fay, this paper bringing out among other points an interesting discussion on the merits of cork inserts; "What Constitutes Ignition Reliability," by A. Atwater Kent, which was illustrated by means of an apparatus which Mr. Kent had designed for the purpose and was followed by a lively discussion on the possibilities of magneto ignition.

On January 19 the papers presented included: "The Economics of Weight Reduction," by F. D. Howe, and "An Improved Type of Compression Coupling," by W. S. Noyes, this last paper relating to a new system of coupling for pipe unions in motor vehicle design.

A paper on "Standardizing Motor Bearings," by S. P. Wetherill, Jr., attracted a very favorable discussion on the value of die casting under compression and the desirability of adopting a scale of numerous standards for engine bearings.

S. W. Rushmore gave a description of a pressure indicator which he had evolved in collaboration with H. L. Towle for internal combustion motors, and Henry Cave gave interesting demonstrations of the possibilities of the autogenous acetylene welding process in repair and manufacturing work.

As a whole both sessions attracted many of the prominet engineers in the industry and were highly successful in furnishing an opportunity for interchange of ideas between the best minds occupied in the development of the self-propelled vehicle in this country.

In the mammoth school building, the construction of which is contemplated by the city of Chicago, nothing will be spared to take avail of all modern conveniences. The trend of the times is well exemplified by the fact that one of the features of the proposed plans, considered as most desirable, is the provision of a huge elevator sufficient to accommodate the heaviest motor truck. The object of this is to permit the delivery of school supplies and appliances to the storerooms, four stories below the ground level, without breaking bulk at the sidewalk. These stores will contain all the supplies necessary for the entire Chicago school system.

The Automoble Livery Service Company has been organized in Birmingham, Ala., to conduct a general transfer business for passengers and baggage. The officers are: H. T. Shoup, president; N. O. Tyler, vice-president; H. L. Brown, treasurer, and A. J. Morgan, secretary.

A Gasoline Street Sweeper is regularly doing the work of six of the former two-horse variety in Berlin, and a number of repeat orders have been placed during the past few months.

THROUGH 100 MILES OF SNOW

The ability of a motor truck to carry loads on snow covered roads is often questioned by those who are familiar only with the operation of horse-drawn vehicles in winter travel. A very decisive answer to this query was recently given by trip made from Milwaukee to Chicago by a Sternberg motor wagon from the shops of the Sternberg Mfg. Co. in the Wisconsin city to Chicago over the highway, which was deep in snow, overlaying deep frozen mud rutted with wagon wheel tracks and the hoofprints of horses. The wagon was one of the stock, gas motor, friction driven, machines of 1,000 pounds capacity. With a heavy load protected by tarpaulin cover the wagon left the builders' yard at 11 o'clock in the forenoon and plowed its way to Racine, about 25 miles distant, where it arrived in four hours and where a stop for luncheon was made. After a delay of an hour and a half the journey was continued and Waukegan—distant about 25 miles—was reached at 6:15 P.M. and a thirty minute stop was made for a hasty dinner. From the Illinois line to Chicago the roads were in better condition, comparatively, for not a foot of the way was good going, and Chicago was reached at 9:30 P.M.

STERNBERG TRUCK EN ROUTE TO CHICAGO

The odometer reading was 102 miles, which were covered in 7 hours 40 minutes running time—an average speed of 13 miles an hour. About 12 gallons of gasoline and 2 quarts of lubricating oil were used in making the trip. No time was lost on the way in making any repairs or mechanical adjustments to the wagon mechanism though there were frequent delays caused by the breaking of the tire chains. This gives a good measure of the severity of the test as under ordinary road conditions the chains would not likely have given any trouble whatever.

Compared with what could have been done with animal haulage the record made was extraordinary, but really no comparison is possible for it would have been commercially impracticable to use relays of horses to cover the distance, and even with an unlimited number of animals at command the trip could not have been made in anything like the same time. The accompanying illustration shows the loaded wagon as it appeared on the trip. After arrival in Chicago the wagon was used in making demonstrations for prospective buyers.

The Commercial Vehicle

Vol. IV March, 1909 No. 3

MOTOR FIRE APPARATUS INSTALLED IN NEW YORK

Knox Combination Hose Carrying and Turret Pipe Motor Truck the First Piece of Modern Self-Propelled Apparatus in the Metropolis

C. E. STONE

THE introduction of the high-pressure system of water mains in the business districts of New York City for the special purpose of fighting fires, has brought about some radical changes in the methods of the Metropolitan Fire Department. Early trials of the system during fierce conflagrations showed that the available streams of water, from connections made with these mains, were of far greater fire extinguishing capacity than those obtained by the use of even the most powerful "steamers," and in the districts where the mains are laid the service of the latter machines has been practically discontinued. With the introduction of the high-pres-

DEMONSTRATION OF KNOX TRUCK FOR HIGH PRESSURE SERVICE IN NEW YORK sure system, however, came the problem of handling the much heavier hose (capable of withstanding 400 pounds per square inch working pressure) and mechanically supported nozzles necessary for effectively using the high-pressure without injury to the firemen. Horsed vehicles were put in service as hose wagons, but the increased load of material meant a lower rate of speed in getting to a fire. The efficiency of all fire apparatus bears a close relation to the elapsed time between the outbreak of a fire and the impact of an effective stream of water.

CONDITIONS DEMAND MOTOR TRUCKS

The conditions pointed imperatively to the motor fire wagon as a means of transportation of the high-pressure apparatus from the engine house to the scene of the fire. An order was accordingly placed with the Knox Company, of Springfield, Mass., for a powerful gas-motor truck, which would be capable of conveying apparatus and a crew to a fire with a minimum loss of time. The vehicle, which is illustrated in action herewith, was completed in time to be exhibited at the recent automobile show in Madison Square Garden, where it was one of the features of the commercial vehicle section. It is noteworthy, also, as the first piece of modern self-propelled fire apparatus to be installed in New York. Many small cities and towns throughout the country have long had in service self-propelled fire apparatus of various sorts, but hitherto New York has been content to get along with horse-drawn apparatus and a few motor vehicles of the pleasure car type for the rapid transportation of officers of the fire department about town. Somewhere in the city, we are informed, there are a couple of self-propelled steam fire engines installed more than a score of years ago, very similar to those in service in Hartford and Boston, but for some reason having weight with the department these machines are never seen on the city streets.

THE NEW KNOX TRUCK

In designing the new Knox fire truck, it was decided to combine in the one vehicle carrying capacity for men and material and also a fire-fighting station, which latter took the form of a turret pipe that would be capable of projecting a 3-inch stream of water that not even masonry could resist, and one that would be far beyond the possibilities of manual control.

The Knox truck consists of a regular 5-ton commercial vehicle chassis, fitted with a steel sided body and a slate floor covered with wood, with air space between. It is propelled by a four-cylinder water-cooled motor of 50-horsepower and in its transmission system and control is identical with the regular Knox product, described in detail in the December, 1908, issue. Above the gasoline tank is suspended the regular fire bell which is carried in addition to the peculiar sounding siren adopted by the Department. In the forward end of the body and well braced on the sides and floor is mounted the turret pipe, the distance from the floor to the tip of the nozzle being 7 feet. Water connection with the turret pipe is effected by means of 3-inch, two-way, siamese connections at the sides of the truck directly beneath the running boards; this arrangement permits of four streams of water being connected to the turret pipe. The body is divided into three compartments lengthwise for carrying 2,200 feet of 3-inch hose and attached to the sides at the rear are racks for carrying nozzles of varying sizes and types. Beneath the body, directly back of the rear wheels and forming part of the steps, is a large locker extending the full width, used for the storage of cushions, tools, axes, siamese connections and the like. On the rear steps are another tool box and chemical extinguishers. Hand rails extend along the sides and through the center of the truck above the hose compartments. A large acetylene searchlight with electric lighting attachment is mounted on the dash, and a heavy tarpaulin cover is placed over the driver's seat and engine compartment when the truck is in action. The wheels are fitted with Hartford tires, 36 by 4-inch front, and 36 by 4-inch dual rear.

TEST OF THE TRUCK

With the closing of the Madison Square Show, the truck was driven to the shops of the Fire Department at the foot of West Fifty-sixth street, and on Sunday, Jan. 24, the truck, with Chief Croker and other officials of the Department and Knox Company, numbering in all nineteen, left the shops promptly at 11 o'clock, followed by Chief Croker's car on a trial run. The day was very poor for a good performance, being misty and the pavement covered with slime, snow and ice, rendering traction a very difficult matter. The route extended through Fifty-sixth street to Broadway, then down to Fifth avenue and Twenty-third street, down Fifth avenue to Thirteenth street, west to Gansevoort street, at the foot of which is the station of the Fire Boat, *Thomas Willet*, where the run ended and the test was carried out.

The total elapsed time of the run was eleven minutes and at certain times down Broadway and Fifth avenue the Jones speedometer on the dash registered 37 miles an hour; as Chief Croker remarked, "it was going some."

Very careful observation was made while turning corners, but though some of them were taken at a high rate of speed, a greater side slip than 2 inches was not noted: the touring car in the rear on the other hand, would often slide 12 inches or more. It should be remembered the truck was running very light and often made turns on exceedingly slippery pavement, so the tractive effect of the tires was the more remarkable; no chains were used.

After reaching the pier, two lines of hose were coupled to the pumps of the fire boat and the truck, and with a water pressure of only 190 pounds the turret pipe threw a stream an estimated distance of 300 feet out into the North River. Since the initial trial the Knox truck has demonstrated its great tactical value and efficiency at many fires. It is stationed at High Pressure House No. 72, on East Twelfth street, near Broadway, and when sent to a fire is manned by nine firemen and one officer. Every member of the crew is being trained in expert driving of the truck.

The more general installation of such machines and motor-driven aerial ladders, similar to that built by the Seagrave Company, of Columbus, Ohio (described in the issue of November last), will certainly result in the saving of many lives and millions of dollars worth of property every year, which would be lost by the continued use of the present inefficient horse-drawn equipment.

AN ELECTRIC AMBULANCE has been ordered by the Indianapolis Board of Health to replace the horse-drawn vehicle used by the city dispensary.

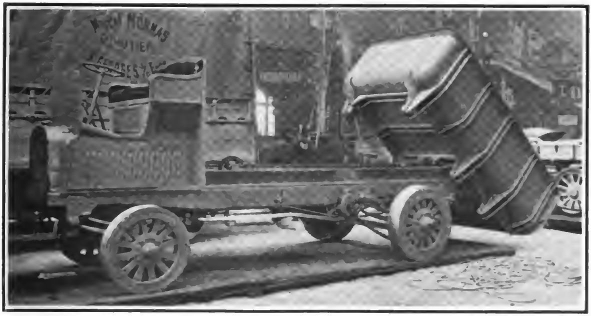
DEVELOPMENTS NOTED AT THE PARIS TRUCK SHOW

New System of Dumping Mechanism Employed by Delahaye—Pneumatic Tires for Heavy Vehicles—Taxicab Chassis Fitted with Delivery Wagon Body

HENRI GODEFROY

PARIS, France.—Among the large collection of commercial motor vehicles at the recent Poids Lourds Salon, many of them of conventional types, there were of course some special ideas presented in construction and those more especially of interest to American readers will be discussed. One vehicle worthy of more than passing consideration is the Delahaye dumping wagon illustrated in the accompanying photographic reproduction. This concern is already well known in the United States as a manufacturer of taxicabs. The wagon referred to has a capacity of 5 tons, and is driven by a four-cylinder 30-horsepower motor, with 4 by 7-inch cylinders—the long stroke will be noted. In the illustration the tank body is shown in the lowered position for emptying the load.

Taking into consideration, first, the general construction of the chassis, it will be noted that the frame is made of pressed steel and swept inward at the front end to permit of a very broad load platform without interfering with the play of the steering wheels. The vehicle is carried on two full sets of springs, clearly shown in the engraving. The lower set, which is shackled at both ends, carries the complete weight of the vehicle when empty. The upper set works on slides with which it only comes in contact when the addition of the load in the tank body has sufficiently deflected the lower set. The wagon is mounted on artillery type wood wheels, shod with plain steel tires; it will be noted that the employment of a double spring suspension considerably facilitates the use of rigid tires. With the ordinary spring construction a steel-tired vehicle when running empty is almost entirely unsuspended, as the resiliency of the springs is practically negligible in a heavy vehicle when no load is carried. In this Delahaye construction, however, the case is different; the resiliency of the springs is practically constant whether the vehicle be loaded or unloaded.



DELAHAYE DUMPING WAGON, WITH CHAIN CONTROLLED TANK BODY AT PARIS SHOW

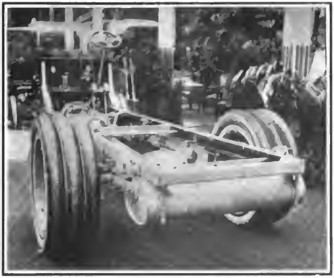
The double side chain drive is through silent saw tooth chains. It seems surprising that chain cases have not been fitted, as with a chain of this type a small stone getting between the chain and the sprocket would likely cause serious trouble—it could not be squeezed out as in the case of an ordinary open link chain.

Another interesting feature of this vehicle is the system by which the tank is raised and lowered for loading and unloading. The Delahaye dumping wagons which had previously been put out had the usual features of vehicles of this type; that is, a pivoted tank operated by suitable racks, toggles or swinging beams. The main disadvantage of these devices is that their operation is based upon the rigidity of parts which cannot always be given a size sufficient to safeguard against distortion; also they are usually of a more or less complex character and are liable to disarrangement. The Delahaye system is a new and apparently practical solution of the problem. On top of the frame sides there are riveted strong steel channels which form a track for six bracketed rollers carrying the tank, as shown in the illustration. The tank body is held in position or moved along this track by a heavy chain running lengthwise of the chassis, which is attached to the bottom of the tank body and is operated by a winch at the front end of the vehicle; the chain rides on a return pulley at the rear end. When the tank is pulled toward the rear the rollers follow the channels, which sweep downward at the extreme rear end of the vehicle. When the point where the channels are bent is reached the rear rollers supporting the tank body are guided down the incline, the tank pivots around the center rollers and the front pair leaves the channels, which latter are slotted on a short length for the purpose. Operating the chain in the reverse direction returns the body to its running position.

At the Saurer stand there was exhibited a 3-ton truck chassis, fitted with an 18-horsepower, four-cylinder motor, which embodied the well-known Saurer characteristics and was further notable for an equipment with pneumatic tires.

It is probably owing to the skill of the French manufacturers of pneumatic tires that persistent efforts have been made here to adapt them to heavy commercial vehicles. In the earlier experiments it was found that a single tire of large size, capable of sustaining the necessary load, was very short-lived on account of the internal friction set up between the numerous layers of fabric in the shoe. To remove this difficulty the Michelin company has been experimenting with multiple pneumatic tires, and has already brought out twin and triple pneumatic-tired wheels. In these latter the tires are mounted on individual clincher rims, which fit over a common quick detachable rim, thereby considerably reducing the time and trouble necessary in case of repairs or replacements.

In the accompanying illustration the equipment of the Saurer truck is clearly shown. In this particular instance the tires fitted are of the leather tread steel studded type. These tires are so proportioned that should any one of the three on each driving wheel give way the other two in the same set could be relied upon to finish the day's work. It is claimed that in practice good results are obtained, although it is not clear how the operation of the vehicle with one of the tires deflated would not result in serious damage to that tire. For passenger vehicles there seems more reason for the employment of pneumatic tires than is the case with freight carrying machines. Many engineers believe, however, that the true solution is a more improved form of spring suspension and the employment of solid rubber tires, which are far less liable to roadside damage and consequent delays in operation.


SAUER TRUCK WITH TRIPLE PNEUMATIC TIRES

Several light delivery wagons at the show were conspicuous by the fact that they were an adaptation of a box body to a taxicab chassis. The adaptability of these mechanisms to the rapid transportation of light merchandise is evident, and the fact that satisfactory results have been obtained in their operation indicates a new outlet for the product of the taxicab shops.

In the accompanying engraving a Fiat taxicab chassis exhibited with a delivery wagon body is illustrated. The carrying capacity of this vehicle is rated at 1,000 pounds. Probably the most efficient service, having the tire problem in mind, would be obtained with a load of not more than half that amount. The finish of the vehicle is most elaborate and its general smart appearance would certainly find favor with merchants who conduct a retail business of a high-class character.

FIAT WAGON BODY ON CAB CHASSIS

One of the Most Prominent tea companies in the United States, a concern which operates 323 branch stores and uses about 1,500 horses in distributing its supplies, has, after a series of careful tests, decided to adopt the gasoline motor vehicle for its delivery service. This company has probably investigated the matter of delivery economics more thoroughly than any other concern in the country, says the New York *American*, and has become so convinced and enthused that it has placed its first order for a number of trucks to be used at five of its prominent branches. These trucks will be used in the Baltimore, Newark, Washington, Passaic and New Jersey branches. This move on the part of a company whose delivery service is of such magnitude is indicative of the great tendency to substitute motor delivery for horse-drawn service. Hundreds of allied concerns in the United States, which are seriously considering a similar change, are likely to follow the lead.

Plans are Afoot in Chicago, it is reported, for the formation of a large company with ample capital to conduct a transfer and delivery business with motor trucks. Trucks built in Chicago will be used exclusively, because the manufacturers offer a contract to maintain the machines for one, two or three years at approximately 10 per cent. of the purchase price, and to keep every truck in service every day—keeping in reserve a number of emergency wagons for substitutes. Names of the business men who are at the head of the proposed enterprise are being withheld for a while.

SOME PRACTICAL SUGGESTIONS ABOUT STEELS

HENRY SOUTHER, A.L.A.M.

EVERY known steel, used for commercial purposes, is just as available in the United States as anywhere else in the world.

Norway and Sweden have unusually pure ores, but the raw materials made from them are just as readily obtained here as elsewhere.

There is no mystery about them, they are just pure and good. When our fine steel makers want good raw material they get it whether it be from Sweden, Spain, Africa, Cuba or Lake Superior. Our steel makers are just as well trained as any, and can make the best of steel.

They do not always make the highest grades of steel, because the demand does not always exist.

Here then lies the real reason why the early motor vehicle product in the United States was not of high-grade material. It was not demanded. On the contrary by some it was pooh-poohed; the advocate of fine steels was laughed at. "Why buy 15-cent steel when steel could be had for 2 cents"; "With our design any old steel will do" was sometimes heard. Our earliest makers (with exceptions, of course) did not have time to think about what kind of steel they might use. They were too busy making something that would go and keep on going.

STEEL FOR TALKING EFFECT

Now all is different, the pendulum has swung the other way, and some are buying 15-cent steel and putting it where it does no more good than 2-cent steel. Popular opinion demands it and it is advertised. Many, however, have at all times kept pace with the art and began to use high-grade, high-priced steels as far back as 1900 where such steels were called for.

Steels were tried and fully proven. Expert knowledge was used conservatively, and there was no violent swing of the pendulum from the worst to the finest, from one extreme to the other. No advertising was done. A trade secret could not have been guarded more closely. Good cars were built. The secret of the use of steel is to put the *right steel in the right place.*

The highest-priced imported steel suitable for horseshoe nails would not do for an automobile spring as well as the lowest-priced, lowest-grade Bessemer steel made; or for another extreme the best chrome-tungsten tool-steel at 60 cents a pound would not make as good rivets as ordinary steel at 2 cents.

THE TREATMENT OF STEEL

It is not always best to use the very best, the ideal steel for a purpose. The very best is sometimes difficult to handle commercially. Better results may in some cases be obtained by using a slightly less ideally desirable steel. This brings up the importance of handling steel. Much skill has always been expended in handling tool steel; it has always been regarded as most important.

Not so with structural steel; and yet just as much is to be gained by handling it so as to produce a strong, tough material, capable of sustaining shock, vibration and the banging it gets, in a motor vehicle.

The makers of guns, armor-plate, propeller-shafts for torpedo boats, have for many years practised with much skill the suitable treatment of structural steel; but these people and their engineers did not, generally speaking, start the manufacture of motor vehicles; so this skill was not fully used by the automobile engineer.

Some engineers went from the one industry to the other, carrying this valuable knowledge. These men helped to produce the high-grade cars made in this country, which have been every bit as good as any cars in the world, as far as materials and wear are concerned.

All steels were available; and in the United States the right steel was selected for a purpose. It was properly handled and treated from start to finish; the result being a perfectly balanced car as far as wear was concerned. No more could have been done in Europe or elsewhere. Worse has been done in Europe, as shown by the way some imported cars have disintegrated after about two years' use.

BREAKAGES DUE TO BAD DESIGN

In other words the materials are available everywhere, the knowledge of how to use them is not. That is the difficulty. Breakages are due quite as often to bad design as bad material. The worst of it is that the bad designer may be found in combination with the bad chooser of materials. He "knows it all."

Unfortunately those who know the least about steel and its treatment are continually rushing into the public press and spreading a lot of rot about steel. Such stuff is read by many who ought to know better and followed to their harm.

The good steel is there just the same, awaiting intelligent selection; and good machines are made by those who select wisely.

All this goes to show that the materials are to be had for the asking at a price.

The problem is to know what to ask for and how to get best value for money spent; all things considered, what is right for one job may be wrong for another.

A MOTOR STAGE LINE is being operated now between Waynesboro and Girard, Ga., by a company capitalized for $10,000. The distance one way is twenty-five miles, and at the start only one round trip will be made daily. Running time is two hours each way.

DURING A RECENT TEST of a Rambler motor fire truck in Pomona, Cal., the machine carried nine men and a load of 1,500 pounds of pig iron at a speed of forty miles an hour, although the specifications called for a speed of only 25 miles with a load of 3,000 pounds. The men carried in the test comprised the Pomona board of trustees and fire commission. The truck is to be equipped with a body for carrying chemical tanks and 800 feet of water hose. It is proposed to buy a duplicate of the machine in the near future so that the first can be driven direct to a fire with the chemical apparatus while the second stops to connect a line of hose with the fire hydrant.

COMMERCIAL EXHIBITS AT THE CHICAGO SHOW

Very Few Commercial Motor Vehicles Were on View at the Coliseum and Armory—Discussion of Exhibits Found Among the Parts and Accessories Suitable for Commercial Service

HARRY W. PERRY

SO far as the number of exhibits of motor trucks and delivery wagons was concerned, the ninth annual Chicago Automobile Show, held in the Coliseum and First Regiment Armory from February 6 to 13, inclusive, was distinctly inferior to all of the big exhibitions in both New York and Chicago for several years past. Tattersall's building, on Sixteenth street west of State, which was almost completely filled last winter with a separate commercial vehicle section, was considered in too poor repair and too remotely situated from the Coliseum to be suitable for use again, and efforts made by Manager Samuel A. Miles to secure the use of the new Furniture Exchange building on Wabash avenue and Fourteenth street were unavailing; consequently, it was impractical to hold a separate display of commercial vehicles, and on this account most of the manufacturers decided to refrain from exhibiting since the only spaces they could get were in the Armory and the Coliseum annex, where the big machines could not be properly displayed.

In the entire show, with its ninety-three exhibitors of complete motor cars, there were but three exclusive exhibitors of commercial vehicles—a showing that serves only to belittle an important and rapidly growing industry in which more than 100 active builders of motor trucks and delivery wagons are already engaged. This show more than any of its predecessors emphasized the real necessity for holding a separate exhibition of commercial vehicles, preferably at a different time from the pleasure-car shows.

The most imposing and comprehensive display of trucks was made by the Rapid Motor Vehicle Co., which secured a large space on the floor of the First Regiment Armory. Its exhibit was the same as the company made at the Grand Central Palace show in New York during the first week in January and included the new 5-ton chassis with vertical four-cylinder engine and sliding-gear transmission, a white hospital ambulance, tourist or sight-seeing stages, and a delivery wagon and truck, on 1-ton and 2-ton chassis of the company's earlier models.

A 1-ton chassis and a 1½-ton chasis with a stake body which, however, could not be shown in position on the chassis because of the low ceiling in the basement of the Coliseum Annex, comprised the display of the Grabowsky Power Wagon Co. Both these machines were exhibited at the Grand Central Palace in New York, together with others. Their chief characteristic is the interchangeability of the entire power plants as units and of all the individual parts of the power plants. The power plant in each machine includes a double-opposed water-cooled motor set crosswise on a sub-frame at the front of the main frame, and also a planetary transmission on the same frame. The construction is such that by disconnecting the brake rods and the connections to the radiator and exhaust pipes, the sub-frame can be drawn forward and the engine and transmission removed with their attachments all intact, and a duplicate power plant substituted in a half hour or less. The purpose is to enable the owner to keep the vehicle in constant service even when the engine needs overhauling, adjustment or repair. Much attention was attracted by these Grabowsky wagons.

Three of the Randolph Motor Car Co.'s new 1,500 delivery wagons were also on exhibition in the basement of the Annex, where the tops of the bodies just cleared the ceiling. The Randolph company is a comparatively new Chicago enterprise which has gone into the commercial vehicle industry exclusively and in a large way. It is devoting most of its energies now to the production of delivery wagons, and is able to turn out about one a day, but it is also bringing out a complete line of heavy trucks up to 5-tons capacity, to be placed on the market in numbers. One of three wagons shown—a panel wagon with rear doors—was sold on the first day of the show to

RANDOLPH 1-TON GAS MOTOR WAGON

RANDOLPH 1,500-POUND ENCLOSED WAGON

H. M. Stevenson & Co., merchant tailors of Chicago. Another, with large plate-glass windows in the sides, belonged to Berlin, the cleaners and dyers, and was loaned for exhibition purposes. The third machine was of the standard screen-body type.

The Randolph delivery wagons are fitted with either friction drive or sliding-change speed gearsets at the option of the purchaser, and are driven by double-opposed water-cooled engines set crosswise under the footboard between the radiator and the driver's seat. In the friction-driven machines the drive shaft carries a large friction disk at its rear end, which comes into contact at right angles with a friction wheel mounted slidably on a countershaft. This countershaft has a spur-gear differential near the right-hand end, and final drive is by side chains to sprockets on the rear wheels. There is only one side lever, and it is used to slide the friction wheel on the countershaft across the face of the friction disk. There is one pedal for the brake and another to hold the friction wheels in contact.

The side frames of pressed steel are raised several inches, from the driver's seat to the rear end, where they are carried on full elliptic springs with trunnion supports. Wood sills with angle-iron guides are secured to the frames, and the body sills slide in the angle-iron guides. The bodies are made easily interchangeable, being held in place by only four bolts, which are accessible from the outside, as they fit in lugs bolted to the chassis frame and the body sills. A fine example of the most modern practice in gearset construction was shown separately as the drive employed in the gear-driven wagons.

In the Armory one of the new type of high-wheeled light delivery wagons was shown by the Anderson Carriage Mfg. Co., which makes the Anderson motor buggy as well as an extensive line of horse-drawn vehicles. It has a load capacity of from 700 to 1,000 pounds and sells at a low price. It is driven by a two-cylinder opposed engine set lengthwise under the body, and has a two-speed planetary transmission. Final drive is by side chains. The frame is of steel and is mounted on three full elliptic springs, the one in front being placed transversely. Wood reaches reinforced with steel act as distance rods between the front and rear axles. Wheels are 36 inches in diameter and are fitted with solid Swinehart tires.

The little Brush 500-pound delivery wagon which was shown by the Brush Runabout Co. at the Grand Central Palace show this winter and last winter, was again given space in the Chicago display. It is driven by a single-cylinder, vertical, water-cooled engine placed under a hood in front. The wheels are of the automobile type and are fitted with pneumatic tires. The body is small and the sides are of heavy canvas painted.

Up in the motorcycle section which occupied all the central area of the second floor of the Annex the Reading Standard Co. showed in addition to its regular motorcycles, the new motorcycle package carrier which it also displayed in the Madison Square Garden show this winter. The carrier is not an attachment but is a permanent construction and the machine is intended for making quick deliveries of small, light parcels. It is of tricycle construction, with two wheels in front, fitted with automobile-type steering knuckles. Over the axle is a large sheet-steel box supported on easy springs and having doors in front. The rider sits over the rear wheels, with the engine hung in the loop of the frame. It is driven by a one-cylinder motor, with magneto ignition, and rated at 4 horsepower. At the option of the buyer a single, 6-horsepower engine or a V-type double-cylinder engine can be fitted. There are no pedals, a crank being used to start the motor, which runs free when the machine is standing. There is a two-speed planetary gear on the left of the rear wheel operated by a lever, and on the opposite side is a constricting band brake.

Just one real taxicab was found in the show. It was the Thomas, finished all in black and fitted with a Jones taximeter. Heretofore the E. R. Thomas Motor Co. has shown the taximeter cab chassis in conjunction with the complete vehicle, but this time it displayed one of the bodies before upholstering or applying rough finish. If anyone had any doubt as to the ability of the Thomas body to meet the severe usage of public cab work, a critical examination of this body dispelled it completely. The framing was of heavy, carefully selected and seasoned oak, with top bows of the same material. All hinges were of heavy metal sunk into the wood and heavily screwed. They were of ample size and thickness and made of steel or bronze. The body panels were of sheet steel. Throughout the construction it was evident that no attempt had been made to save weight at the sacrifice of strength and durability. It was also clearly an expensive piece of body work.

It will be seen from the foregoing brief review that while the commercial vehicle exhibits were extremely limited in number, they were varied in character.

COMPONENT PARTS AND FITTINGS

It would naturally be expected that in the great multiplicity of component parts, fittings and accessories shown at a big national automobile exhibition, there would be displayed many such parts especially made for heavy commercial work. But such never has been the case, and this great field still lies open and fertile for the designer and manufacturer. Many makers of sundries will assure the inquirer that their products are as suitable for use on motor trucks and delivery wagons as on pleasure cars, but it is usually found, upon pursuing the subject further, that they have no trade whatever with commercial vehicle makers. None of the many lamp makers has yet brought out a plain, heavy, durable oil, gas or electric lamp for truck work, and the Grabowsky Power Wagon Co. has found it necessary or desirable to have oil lamps especially made for its wagons with bracket sockets on both sides of the body instead of on one side only. This is only one of numerous examples that might be cited.

Apart from those shown in the spaces of complete pleasure-car builders, there were very few motors on exhibition, and only two or three makes of these were suited to commercial work. One of these was the Milwaukee motor, shown by Brandenburg & Co. as selling agents. There was a four-cylinder and a six-cylinder model on exhibition, of the same pattern as that shown at the New York show. The former only is suitable for truck work, and is a well-designed and well-built engine that has been on the market for years with considerable success. It has every appearance of strength and durability befitting it for heavy, rough work. The weight is somewhat reduced by the use of a crankcase of aluminum alloy. All valves are on one side.

Another engine was of the American horizontal opposed type, such as is used extensively in motor delivery wagons. It is built in two sizes—20 and 24 horsepower—by the Multi-Unit Gas Engine Co., of Chicago, and was exhibited in the booth of Fulton & Zinke, the selling agents. Simplicity, compactness, durability, moderate first cost and economical operation are characteristics especially claimed for the engine. There are four opposed cylinders, cast in pairs, with one-half the crankcase cast integral with each pair. Each pair is in line with the opposite pair so that there is a single piece piston for each opposed pair, with but a single connecting rod, the ends of the pistons being joined by four arms. Thus there are but two bearings on the crank instead of four, and the double-headed piston reduces the wall thrust per square inch of area to the minimum; the pistons are also cushioned at the end of each stroke, reducing the thrust on the connecting-rod bearings and crankshaft. The water jacket extends the full length of the piston stroke and, in fact, down to the crankcase. The valves are entirely surrounded by water. The jacket is cast integral with the cylinder castings, so that the engine is comprised of but two main castings. This reduction of parts, the ability to reduce the speed instantly from 1,500 to 100 revolutions per minute, and the fact that jigs and templets are used for construction throughout, enabling replacements to be made quickly and cheaply, especially adapt the motor for delivery wagon or taxicab work.

In the same stand was also shown the Sommer motor, built by the Sommer Motor Co., of Aurora, Ill. It is made in three sizes and is adapted for truck and delivery wagon service as well as for motor-car and marine work. The several sizes are rated at 12-14, 16-18 and 20-22 horsepower. The engine has two horizontal cylinders opposed and with valve chambers cast integral with cylinders and water jackets on the upper sides of the heads. The crankcase is a separate casting of cubical form with a cover plate that is bolted on and two large circular plates carrying the shaft bearings, to bolt on the sides. Between the crankcase proper and its cover is a casting which carries the camshaft with its gear and the valve push rods. This is easily removable to give freer access to the connecting-rod bearings. The construction provides the maximum of accessibility together with simplicity. The parts are all made by standards, jigs and fixtures, which insures interchangeability. Weight of the 20-22 horsepower size is 342 pounds.

IGNITION APPLIANCES

A large number of batteries was on exhibition, chiefly small storage batteries for ignition and lighting purposes, although the Electric Storage Battery Co., of Philadelphia, showed its well-known Exide vehicle batteries and the National Battery Co., of Buffalo, its National vehicle batteries. A number of dry-cell batteries for ignition were shown, but these were outnumbered by the storage or wet batteries, nearly all of which can be used on commercial vehicles, although some are better adapted for the work than others because of their substantial construction, such as the Witherbee and the new Combat "igniters." The latter exhibit was made by the Commercial Battery Electric Co., of Chicago, which also makes vehicle batteries. The particular suitability of the Combat ignition battery for commercial work is due to the use of an external pressed-steel case in which the hard-rubber jar sets and also to the use of grids that prevent the active material from dropping out. The case is a japanned and the rubber jars are of heavy construction and have a tightly-fitting, hard-rubber cover that makes it impossible for the fluid to slop out. The cover is sealed without any metal fastenings and grease-cup attachments around the terminals prevent any electrolytic effect or corrosion at the terminals. The Commercial Battery Co. makes storage batteries in all sizes from 3 plates per cell and 22 ampere-hour capacity to 33 plates per cell and 352 ampere-hour capacity.

The Pfanstiehl Electrical Laboratory, at North Chicago, is one of the few concerns that have recognized the need of special construction of fittings for commercial-vehicle service. It displayed among various styles of motor-car spark coils a special coil provided with an extra heavy case made of plain oak polished. This coil has all the accessories that appear on the dash coil except the switch, and was first made to order especially for the Reliance Motor Truck Co. and is now being used also by the Randolph Motor Car Co. It is made for any number of cylinders and can be bolted or screwed to the dash or frame and will not jar loose or to pieces. A special feature of all Pfanstiehl coils is the patented "pancake" or sectional method of building up the secondary circuit, such as is used in the construction of wireless telegraph apparatus. This system consists in the use of a series of separate hard-rubber collars which are placed on a mandrel and wound by machinery automatically, the two sections being wound in opposite directions at the same time, thereby saving time and also eliminating self induction between the pancake sections, which would tend to check the flow of current. Increased efficiency is secured by winding thus in many sections to cut the magnetic field of the primary core in many parts, and by this method the makers get more windings and get the windings closer to the core than by other systems. At the same time, the perfect insulation provided by the rubber collars eliminates the likelihood of a breakdown at the ends. As the wires are wound, each wire passes five times through a special bath of insulating material before it goes to the collar on which it is wound. The efficient insulation enables the use of cotton-covered wire, rendering the coils less costly than when silk-covered wire is used. When wound the collars are mounted side by side on a core of shellacked cloth through which the primary core is thrust.

Something new in ignition systems was shown by the Standard Ignition Co., of Chicago. This invention comprises a "multiple-speed spark generator" and the Midget combination distributer and timer. The latter weighs less than one pound and terminal wires of any size can be permanently attached or detached in an instant without burr, clip or screw. The multiple-speed generator is constructed so that by means of a switch that is screwed to the face of the case three distinct spark-speed volumes can be obtained, giving streams of sparks at different intensities ranging from 100 sparks a minute to more than the requirements of any gas engine at its maximum speed. The low-speed spark volume will ignite a one, two, four or six-cylinder engine pulling a pleasure car at a crawl or up to twenty-five miles an hour, while the high-speed spark volume will furnish ignition at the maximum rotative speed of the engine. This system enables the driver to get a stream of sparks of sufficient volume and heat to start a cold engine with one turn of the crank shaft, it is asserted, and also makes it easy to time the ignition of the engine accurately, as there is but a single unit in the coil.

A new make-and-break igniter in the form of a spark plug was shown by the Churchill-Lee Co., of Detroit, in the space of Fulton & Zinke, factory representatives. This device is called the M. D. C. spark plug and requires no high-tension current. It can be used in connection with any make of timer and its construction admits of the use of a low-tension magneto if desired. It is simple and durable in construction. The make-and-break mechansim is contained in a shell threaded into the nut which screws into the cylinder and is actuated by a core in the head of the shell that is energized by the low-tension current to alternately attract and release a part of the mechanism.

Legnard Brothers, of Waukegan, Ill., showed a new spark plug called the Auto-Marine, which is without doubt the most easily and quickly removed plug in the market. It is not even necessary to detach the terminal wire to remove and examine the spark points. The tempered porcelain insulation is carried in a shell that fits in the threaded nut of the plug with a taper fit and a breech-block type locking device. A little handle covered with non-heat conducting material is permanently attached to the shell, so that it is merely necessary to take this handle in the fingers, give the shell a quarter turn and lift it out of the nut in the cylinder head to examine the points.

OILERS AND TUBE COUPLINGS

Mechanical force-feed oilers were exhibited in several types by Edward Neely & Co., of Chicago, some in operation to show the action. The Neely oilers are made in back, end, and top drive styles, and in sizes from 8 to 18-pints capacity. The several sizes have six, eight and twelve feeds. The entire mechanism is built up from rods and sheets of drawn steel, round and hexagon brass rods and brass tube, thereby not only enabling the manufacturers to produce the oilers at low cost but facilitating the repair and replacement of parts by the user. All the valves are accessible without disturbing the inside mechanism. As the oiler can be depended upon to deliver from one to eight drops of oil at each cylinder displacement according to the adjustment of the pump, it is practicable to place the lubricator inside the engine compartment under the dash or under the seat instead of in sight on the dash.

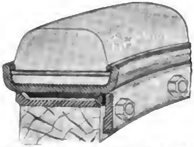
Several new features are incorporated in the force-feed lubricators that were shown by the McCanna Mfg. Co., of Chicago. Although the principle of the McCanna oilers is the same as has been used for several years, the new models have discharge plungers that work at full stroke all the time and that are of larger area than the suction plungers, a construction that insures a clean sight cup at all times. Adjustment is made through the cover on the suction plunger only. Both plungers are packed with hydraulic packing to make the oiler positive and reliable under all conditions. The reservoir is made of pressed steel enameled and fitted with a brass cover and sight-feed housing.

A most extensive display of brass goods was made by the Imperial Brass Mfg. Co., of Chicago, including solder and solderless pipe unions, cocks, priming cups, lamp brackets, oil pumps, and so on. An interesting and useful new device that the company has recently brought out, and which was shown for the first time, was the Imperial compression coupling. This is made in several forms, to fit piping of 1-8, 3-16, 1-4, 5-16 and 3-8-inch outside diameter. With this coupling no soldering, flaring out of tubing or other preparatory work is necessary for the joining of the tube ends. There is a central coupling having an external hexagon portion at the center to permit of holding with a wrench. Both ends of the coupling are threaded externally and tapered inside. After the tube ends are inserted, tapered sleeves are pushed up into the tapered ends of the coupling and internally-threaded end nuts with collars that just fit the tubing are tightened up on the coupling, wedging the tube ends securely in place and making a tight joint that can be broken only by loosening the nut.

TIRES AND RIMS

Two new productions in tires and rims for commercial vehicles were of especial note at the show. One of these was the new block tire for trucks, just brought out by the Swinehart Clincher Tire & Rubber Co., of Akron, Ohio. This was exhibited at the Madison Square Garden show only during the last two or three days of the week. The complete tire is a twin solid tire on an 8-inch rim, with sectional blocks about 9 inches long arranged in "break-joint" manner. The separate blocks are held in position by L-shaped pieces of steel formed with a groove running lengthwise down the center in order to raise the edges. Under these edges engage the cross wires embedddd in the base of the blocks, both at the ends and along the edges of the blocks in the center of the tire. A circumferential steel-wire ring passes completely around the tire between the two series of blocks and engages in the central groove in the steel strips. A turnbuckle serves to draw this ring up tightly so as to hold the strips securely and retain the rubber blocks in place. By loosening the ring and removing a couple of the L-shaped steel strips, any individual block can be taken out and replaced quickly with a new block.

The other new device is a removable rim for solid tires that has just been introduced by the Firestone Tire & Rubber Co., of Akron. This is made on the same principle as the company's demountable rim for pleasure cars, but is, of course, much more substantial. The permanent rim mounted on the felly of the wheel has a beveled flange around one edge that holds the tire rim on that side. The inner side of the removable rim has a series of square lugs or plates welded to it which give a seat for the rim and tire on the wheel rim. One of these lugs is inserted between two similar lugs or plates welded to the outer face of the wheel rim so as to prevent creeping of one rim on the other. When the tire and its rim have



NEW FIRESTONE REMOVABLE TIRE

been placed in position, a wedge ring of triangular cross section is placed with the apex of the triangle in the groove between the two rims and then a heavy, flat steel flange ring is brought up flat against the side of the felly and the back of the wedge ring and is drawn up firmly in place by nuts that screw on the ends of the bolts through the felly. The flat ring, of course, is drilled to pass over the bolt ends. This makes a perfectly secure and durable job, sufficiently strong to stand the heaviest work. At the same time it enables the user of a truck to substitute without delay a perfect tire for a damaged one without the need for sending the entire wheel to the factory or local tire depot. It is a simple matter for the user to keep on hand several spare tires mounted on the demountable rims, whereas it would be inconvenient and expensive to keep complete spare wheels in stock. The demountable rim has no long wedge shapes and no sharp angles, so that the parts do not rust or adhere together due to accumulations of dirt.

CHAINS AND CHAIN COVERS

The Coventry Wormo roller chains and Coventry noiseless chain, made in England by the Coventry Chain Co., were shown as one of the new sundries by the Excelsior Supply Co., of Chicago, which has just taken the selling agency for these chains in the territory west of a line passing north from Savannah to the west border of Pennsylvania. The Wormo roller chains are made in many sizes up to 2.5-inch pitch and 1.55-inch roller diameter for heavy work. Owing to the special design, they are claimed to have one-third fewer pieces than any other chain of equal pitch and dimensions. The bushes over which the helical rollers revolve are machined integral with the side plates with which they are stamped or forged. The construction admits of no elongation except that due to actual wear. The Coventry high-speed, noiseless chains are now being used for transmission on the heavy types of motor cars, in England, such as motor omnibuses. On account of the conforming action of the links to the chain-wheel teeth, it can be used to advantage over comparatively small driving wheels, and the pitch automatically adjusts itself to the wear.

A chain guard and silencer was demonstrated by the Sorensen Chain Guard & Silencer Co., of Chicago. It consists of a continuous band of Raybestos lining of a length to just fit around the chain and ride on it. To this band are secured a series of metal links that hold side bands in position at right angles to the belt and automatically accommodate themselves to the bending of the belt as it passes around the sprocket wheels. This makes a trough-shaped guard which is fitted over the drive chain of a vehicle and travels with it, deadening the rattle and preventing the chain from scattering grease and oil and from collecting mud and dirt.

MISCELLANEOUS

The coefficient of friction of Raybestos friction lining for brakes and clutches was demonstrated in the stand of the Royal Equipment Co., of Bridgeport, Conn., by means of a little electric motor, a piece of the lining resting on a pulley on the armature shaft with a weight on it, and a measuring scales to determine the brake pull. Fifty per cent. coefficient of friction is claimed for the Raybestos lining, which is woven of fine alloyed copper wires and chemically treated asbestos strands. Its various resisting qualities were demonstrated on a panel on the wall where an alcohol lamp was kept burning under a piece to show that it was heat proof; where a piece was immersed in water to show that it was waterproof and another strip was soaking in oil to show that it was unaffected by lubricants. Although Raybestos is more extensively used as brake lining, the Stevens-Duryea Co. is using it in a multiple-disk clutch and the manufacturers make it in cone shape to be used for cone-clutch facing.

A Buda jack of 20 tons capacity was a feature of the exhibit of the Buda Foundry & Mfg. Co., of Chicago, which also showed one of 5 tons capacity for motor trucks in addition to a variety of styles and sizes of less capacity for pleasure cars. These jacks are made of malleable iron that will not break or crack and the teeth are machine cut from a solid steel bar. It has a swivel top that permits the jack to be used at any angle and is single acting, lifting the load on the downward stroke of the handle. The trigger for reversing the action is in a position where it is always accessible. Reinforcing ribs are cast on the frame and top where they will strengthen the construction.

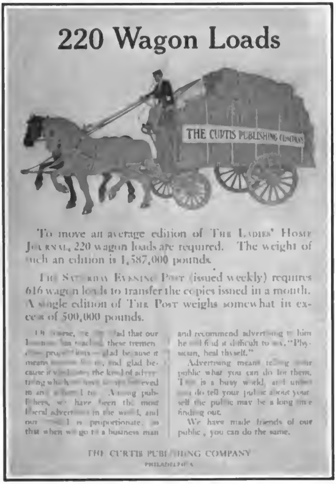
Pressed-steel tool and battery boxes, with wood linings, were shown in various styles and sizes by the Globe Machine & Stamping Co., of Cleveland. Styles B and C are made from the best steel and have only one seam—at the back—and the covers are pressed to shape and fit snugly over the flange of the boxes. They are very suitable for use on commercial vehicles where the ordinary wooden boxes would be subjected to too rough usage.

The Recometre, for recording every movement of a motor vehicle "all the time," was exhibited by the Chicago Recometre Co., western representative of the manufacturers. This instrument comprises in a single case a speed indicator on which a revolving hand indicates the speed in miles per hour at every instant; a trip odometer and 10,000-mile total register, and a traveling tape and marker that provide a permanent record of the movements of the machine and its speed at every stage of its trips. A portion of the tape is always visible through a glass at the top of the instrument, and it is divided into vertical sections representing clock time, so that the marking point always points to the exact time of day. Movements of the tape are controlled by an eight-day clock combined in the mechanism. The year and days of the month are printed on the tape, so that the tape gives a record of the mileage rate of speed and duration of stops, and is under the sole control of the owner or superintendent.

Steering gears for trucks of 1 to 5 tons capacity and for motor wagons were shown by the Ross Gear & Tool Co., of Lafayette, Ind. The design of these gears is such that no amount of use will cause them to develop excessive lost motion, as the bearing surfaces are very large and the gears are both oil tight and dirt proof. All points, lines and small surfaces of contact are eliminated. The gear for 5-ton trucks weighs 80 pounds, has a 22-inch wheel and 192 lineal inches of contact surface, giving 24 square inches of bearing surface that is in contact all the time. Three turns of the steering wheel are required to throw the arm 90 degrees. The steering arm has a 1¾-inch ball on the end and extends half-way up in the gear housing without a break. The steering gear for 1-ton to 2½-ton wagons is of the same general design, but is of lighter construction, weighing only 38 pounds.

DELIVERY METHODS A GAUGE OF PROGRESS

THERE is more than a suggestion of incompleteness about the caption over the picture of the horsed vehicle in the advertisement here reproduced. Filled out to its logical conclusion the big, bold-face line ought to read: "220 Wagon Loads Moved at the Highest Possible Cost." To go back just a step or two further in antiquity, which the hieroglyphic character of the drawing suggests, it would have been more "catchy" to have reproduced a line of laborers carrying the mail sacks on their heads. That there is also a humorous side to the publicity man's efforts is apparent when one reads in the pages of a New York daily an advertisement, by the same publishing house, in which he says: "You see we believe strongly in our publications. * * * It is because they have the habit of making good." And then turning to the *Saturday Evening Post* one can find a big, two-color poster advertisement of a motor truck maker's product which tells the reader that this well-known and successful house manufactures "a complete line of heavy trucks * * * for every commercial use." The publicity man or those who employ him evidently make a subtle distinction between believing "in" the publications and believing what is IN them.



220 Wagon Loads

THE CURTIS PUBLISHING COMPANY

To move an average edition of THE LADIES' HOME JOURNAL, 220 wagon loads are required. The weight of such an edition is 1,587,000 pounds.

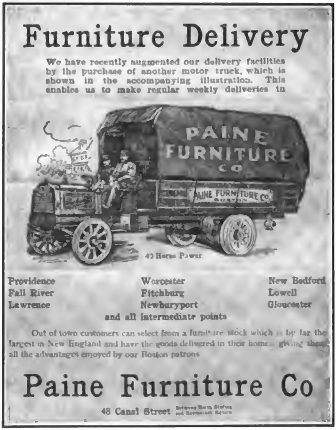
THE SATURDAY EVENING POST (issued weekly) requires 616 wagon loads to transfer the copies issued in a month. A single edition of THE POST weighs somewhat in excess of 500,000 pounds.

THE CURTIS PUBLISHING COMPANY
PHILADELPHIA

MIGHT HAVE APPEARED 100 YEARS AGO

But coming back to the question of cost. Small wonder that the publishers are glad that the business "has reached these tremendous proportions," as the advertisement we reprint declares, for even to the outsider the question inevitably occurs: "How in thunder did it grow so big with the employment of such antiquated methods?"

The use of printer's ink also discloses another and different type of business man—a progressive one this time—in the advertisement of a Boston furniture house which is here reproduced. In this case the merchant is willing to expend the power of 40 horses, bottled up in the small compass of the motor compartment of a Packard truck, to get the purchases of his customers delivered to their homes; not merely within the limits of his own city but in a wide radius within the State of Massachusetts and beyond. The resident of the rural town or distant small city can thus make his selection from the extensive stock of a metropolitan establishment and have the furnishings of his home delivered at the door without rehandling and without the added cost of express or railroad freight service and cartage. That this merchant is satisfied with the work of motor trucks is manifested by his purchase of "another motor truck," as the advertisement sets forth.



Furniture Delivery

We have recently augmented our delivery facilities by the purchase of another motor truck, which is shown in the accompanying illustration. This enables us to make regular weekly deliveries in

PAINE FURNITURE CO
PAINE FURNITURE CO
40 Horse Power

Providence	Worcester	New Bedford
Fall River	Fitchburg	Lowell
Lawrence	Newburyport	Gloucester

and all intermediate points

Out of town customers can select from a furniture stock which is by far the largest in New England and have the goods delivered in their homes, giving them all the advantages enjoyed by our Boston patrons

Paine Furniture Co

48 Canal Street

AN UP-TO-DATE APPEAL FOR BUSINESS

CHICAGO HAS THE DISTINCTION of having the largest motor wrecking wagon for use on its street railway system of any city in the country. This machine has been added to the City Railway Co.'s equipment since the first of the year and is a gas-electric machine with four-wheel drive and four-wheel steer. It weighs 9,150 pounds and in its first test easily pulled a wagon loaded with ten tons of steel off the tracks where it had broken down.

AMERICAN 2,000 POUND WAGON

A type of business wagon that is largely in demand and that is coming into more and more prominence is shown in the accompanying illustration. It is a closed or panel delivery wagon of 2,000 pounds capacity suitable for a great variety of retail businesses. The machine has a standard delivery body mounted on the 1-ton chassis built by the American Motor Truck Co., of Lockport, N. Y. The body shown has a length inside of 6 feet and a width of 42 inches, but other sizes can be made to order. Height under the top is 4 feet 8 inches.

AMERICAN GENERAL UTILITY MOTOR WAGON

The overall length of the vehicle is approximately 12 feet on a 102-inch wheelbase, and the width 57 inches. Wheels are 32 inches in diameter and fitted with Diamond 3 by 32-inch solid tires all around. The machine has a rated speed of 10 to 16 miles an hour.

FRONTENAC 5-TON GAS MOTOR TRUCK BUILT AT NEWBURGH, N. Y.

The construction follows foreign practice in having a vertical four-cylinder engine under a hood in front, as in pleasure car design, the engine being of the water-cooled type with 4 by 4½-inch cylinders and developing 22 to 25 horsepower at 1,200 revolutions per minute. A 6-volt 60-ampere hour storage battery with coil vibrator on the dash furnishes ignition current. Both the splash system and force-feed lubrication are employed.

A large fly-wheel is bolted to a flange turned solid with the crankshaft and receives a leather-faced cone clutch. The three-speed sliding gearset is housed in an aluminum alloy gear box in which the gear shafts run on ball and roller bearings and which also houses the bevel driving gears and the differential gears on the jack shaft. Gears are cut from 3½ per cent. nickel steel stock and have teeth of 1-inch face. Final drive is by side chains to the rear wheel sprockets. Internal brakes of 12 inches diameter and 2-inch face operate within the wheel drums, while two running or service brakes of 6 inches diameter operate on the jack shaft, with pedal control. An irreversible worm type steering gear, with 16-inch wheel, is fitted at an angle of 22 degrees.

Timken roller bearing axles, of I-beam section in front and square section in the rear, are employed and carry the load on semi-elliptic springs, the front pair measuring 36 inches in length by 2 inches wide and the rear pair 38 by 2 inches, all oil tempered and ribbed and secured to the axles by hand forged clips of Norway iron provided with double nuts.

The main frame that carries the power plant and body is made of 2 by 4 inch hard wood, with cross members of the same stock mortised in the side sills with ½-inch iron rods running through to bind the members together. Corners are stiffened with angle iron securely bolted and bound with 3-16 by 4-inch steel armor plate. The standard frame has a length of 12 feet and width of 30 inches.

Eight gallons of gasoline can be carried in the fuel tank. The regular equipment includes two brass side oil lamps, oil tail lamp, horn and full set of tools. Ample mud fenders and continuous running boards serve to keep the body from being splashed with mud.

NEW FRONTENAC 5-TON TRUCK

The steadily growing list of manufacturers of commercial motor vehicles has lately been increased by the accession of the Abendroth & Root Manufacturing Company of Newburgh, N. Y., which is widely known in mechanical engineering circles in this country and abroad and which has now placed on the market a line of gasoline motor trucks, of 3, 4 and 5 tons capacity respectively, styled the "Frontenac." The 5-ton machine is shown in the accompanying engraving. It follows the lines of what might be termed standard American practice, with motor in front under the driver's seat, change speed gearset and side chain drive to the rear wheels.

The motor is of the four cylinder, vertical type, rated at 40 horse power and is easily accessible by the removal of side panels in the motor compartment. A radiator of large capacity forms part of the dash and a forced system of water circulation is employed for cooling the motor cylinders. A magneto and also a storage battery are fitted in a dual ignition system. A leather faced cone clutch, fitted with cork inserts, transmits the power of the motor to the gearset, which is of the selective type, giving four speeds forward and reverse. The gears are cut from chrome nickel steel and are of large proportions to withstand wear and prevent damage in operation. From the gear box the counter-shaft, fitted with differential, extends on both sides to the outside of the frame and carries the driving sprockets for the double side chains by which the rear wheels are rotated. Anti-friction bearings are fitted where required.

Semi-elliptic springs are fitted front and rear. The wheels are of the wood artillery type and are shod with 36 by 6-inch single solid tires in front and 36 by 4-inch dual tires in the rear. There is a large braking capacity; a foot-actuated pedal operates brakes on the outboard ends of the countershaft and a hand lever contracts powerful emergency brakes on drums on the rear wheels. The wheel base of this truck is 126½ inches. Gasoline capacity is 20 gallons.

VEHICLES AT DETROIT SHOW

Had the Detroit "local" automobile show been held in midsummer instead of in the depth of winter it would have deserved a national attendance. The location in the new Wayne pavilion on the riverside gives a beautiful water view and the interior decorations, the scheme for which had been prepared by Mr. E. LeRoy Pelletier, were quite the most tasteful and artistic that have been seen at any of the minor motor vehicle exhibitions and, indeed, rivaled those of the vastly more pretentious national shows. In proportion to its size there were more work vehicles on view in the exhibition held last month than at any of the other shows this year.

A new exhibitor in this field, the Seitz Automobile & Transportation Co., of Detroit, displayed its 3-ton, double-friction drive truck. A chassis was mounted so that the transmission system could be "demonstrated" by an electric motor substituted for the regular gasoline engine. In the accompanying engraving one of the complete vehicles built by this company is shown under working conditions. The power plant includes a Continental four-cylinder vertical motor of 40 horsepower, located under the driver's seat. This drives a metal disk set crosswise in the chassis about in the middle of the fore and aft length of the vehicle. There are four friction-driven wheels arranged in pairs on each side of the driving disk and slidably carried on cross shafts. Thus there are two driven wheels on each side of the center line of the frame with the driving disk interposed between. By a suitable arrangement of toggles and frames the two wheels on the front and back of the driving disk on either side can be brought into close contact with the disk and the motion thus imparted to the cross shafts in reverse directions is transmitted to a countershaft by sprockets and chains. The sprockets on the ends of the rear cross shaft engage the lower side of the chains. From the countershaft the drive to the rear wheels is by the usual double-side chains. Quick speed changes or slowing down and reversal or stoppage of the vehicle can be effected by shifting the positions and contacts of the friction-driven wheels. The control for the use of the driver is very simple, consisting of pedal and hand lever. The vehicle here shown has been in operation for several weeks in all sorts of weather and is reported not to have missed a single trip.

SEITZ TRUCK AT WORK IN DETROIT

In an adjacent stand the Rapid line of commercial vehicles was exhibited, including the chassis of the large truck. A powerful Reliance truck with two-cycle motor was also an exhibit that attracted a lot of attention, its dimensions dwarfing the pleasure cars on near-by stands. At this booth many photographs of Reliance machines, which have been sold to users in a wide variety of occupations, were on view.

Among the lighter commercial vehicles the Reading Standard motorcycle van was a center of interest for retail merchants who visited the show.

Residents of Mt. Airy are planning a motor bus line to Cincinnati because efforts to have the Cincinnati Traction Company extend the Colerain avenue route to Mt. Airy have failed. Samuel C. Cox is forming an organization, with $7,000 capital, and within a few days it expects to have a 60-horsepower machine running from Mt. Airy to Fourth and Race streets, Cincinnati. The fare from Cincinnati to Virginia avenue, the end of Cummingsville, will be 5 cents, and from that point to the northern end of Mt. Airy an additional 5 cents. Freight will also be hauled. The machine will seat 22 persons and make the trip in 40 minutes—less than the time it would take by car.

The Standard Auto and Transit Company, of Mansfield, Ohio, has been incorporated with capital stock of $10,000 for the purpose of operating a motor bus line between Mansfield and Loudonville. George L. Lane, J. C. McNutt and others are interested.

ENDLESS SECTIONAL TRUCK TIRE

There are several features embodied in the construction of the sectional tire manufactured by the Lockport Rubber Works, of Lockport, N. Y., under the Palmer patents, that will commend themselves to the superintendent of transportation or the owner who is charged with the maintenance of commercial vehicles. It is sectional in a different sense from that usually associated with the term, as applied to vehicle tires, in that the tread is not serrated, but forms an unbroken surface when the tire is in position for running. An inspection of the accompanying engravings will make the sectional feature quite clear.

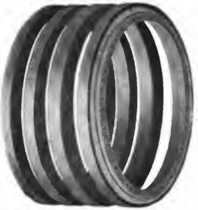


FIG. 1—ENDLESS RUBBER SECTIONS

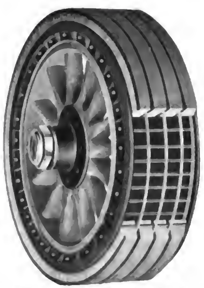


FIG. 2—READY FOR BOLTING UP

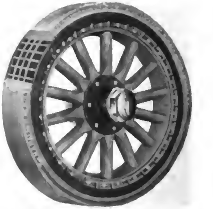


FIG. 3—AFTER BOLTING UP

The sections take the form of circumferential rings, as shown in Fig. 1. This shows an 8-inch tire, composed of four sections, the perforations in the sections around the inner circumference and parallel with the face being made for the purpose of fitting the cross-wires. Side flanges, shown clearly in Figs. 2 and 3, clamp the sections on the rim of the wheel, and, squeezing them together, form practically a solid tire. To fit a tire on the wheel of a vehicle all the apparatus needed is a lifting jack, a hammer for tapping in the felloe bolts and a socket wrench for tightening up the nuts on the felloe bolts.

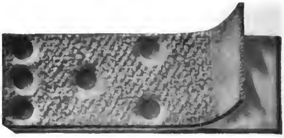
To put on a tire, the inner flange being in place and held by the felloe bolts, which are passed into the holes from the inside, one of the outer moulded sections of the tire is slipped over the steel rim of the wheel. The cross-wires are then inserted, the head of each wire fitting into a recess on the inner side of the flange. When all the cross-wires are in place a circumferential retaining wire ring is laid over the projecting cross-wires; then another section is put on, each cross-wire passing through its proper hole, and the process continued until all the sections and the circumferential retaining rings are in place. The outer flange is then put in place, the felloe bolts being driven through the holes in the ring, from the inside, and then the nuts are screwed on the ends of the bolts and tightened up with the socket wrench. The actual process is indeed much simpler that the explanation of how it is done.

Fig. 3 shows the complete wheel with a section of the tread removed by the draughtsman, so as to show the relation of the fastenings when the tire is bolted up ready for service. The tightening up compresses the rubber sidewise, closing up the sections and forcing the rubber to hug the base; it cannot move outward at the base owing to the circumferential retaining wires.

A valuable feature of this tire is that local damages to the tread can be readily repaired by cutting out the bad places in the sections and substituting new segments, the method of attachment making it just as easy to fit a new segment as an entire new section. Also a tire worn down on one side by long contact with street car rails can be "turned around," or, if need be, a new section on the outside put in place of the worn one. In case of emergency, repairs or replacements can readily be made by the roadside, as no special apparatus is necessary.

THERMOID BRAKE LINING

For the lining of motor-vehicle clutches and brakes the substance called Thermoid has been specially manufactured and marketed by the Trenton Rubber Mfg. Co., of Trenton, N. J. It is composed of rubber, asbestos, and brass combined in the form of strips or shapes suitable for ready insertion in place, permanent attachment being made by rivets, as shown in the accompanying engraving. By the combination of the three materials, which each have a high coefficient of friction, great heat resistance and strength is secured, and the rubber component protects the brass and asbestos from moisture and oil. It is not the effort of the makers to produce a cheap lining, but one that in its application will give high efficiency, and will resist the destructive action of heat and attrition which make the more perishable organic substances usually employed for the purpose very unsatisfactory in the operation of vehicles and expensive, due to the necessity for frequent renewals.


SHOWING FASTENING OF THERMOID LINING

PROGRESS OF MOTOR TRANSPORTATION IN ENGLAND

TO get reliable figures upon the growth of the use of commercial motor vehicles in England, Mr. E. Shrapnell Smith, treasurer of the Commercial Motor Users' Association, addressed letters of inquiry to a large number of known users of motor trucks and wagons and received replies from 342 individuals and concerns. These were classified according to the different occupations of the users and also into annual periods as will be seen from a reading of the accompanying table. The results of this census show a steady increase in the number of vehicles in operation down to and including 1908, and also show the great diversity of services in which commercial vehicles have been and are employed. It will be noted that, as in our own case on this side of the Atlantic, brewers were among the first to appreciate the value of the new method of transportation and that at later periods the development of the passenger-carrying machines has been quite rapid. In commenting upon the situation, Mr. Smith says:

"The undeniable progress of the last few years is measured by higher performance in relation to cost. The cost per vehicle-mile is uniformly less in each class for equal loads than it was even a couple of years ago, while lost earnings and disturbance of business generally are virtually disappearing factors in the problem. It was necessary, four or more years ago, for the purchaser to accept a great number of uncertainties. He paid a high price for the machine in the first instance, and he did not know what it was going to cost per annum. To-day the purchaser is in a happier position. He can, in many cases, obtain guarantees as to maintenance, whether of india-rubber tires or the whole of the mechanical parts; he can obtain written assurances from users who have been employing vehicles of the same make; he can obtain drivers who have had experience on the road—a qualification which is certainly necessary for men who have to go far afield, and fore particularly for those who are in charge of steam wagons.

Mr. Smith states that the users outgo per vehicle mile will not exceed the following amounts: 1-ton gas motor truck, 10 cents per mile; 2-ton gas motor truck, 13 cents per vehicle-mile; 3-ton gas motor truck, 16 cents per vehicle-mile. These costs are based on "full work" schedules, and of course under conditions prevailing in the British Isles.

ANALYSIS OF 342 RETURNS FROM OWNERS OF COMMERCIAL VEHICLES

CLASSIFICATION.	No. of Returns Received	GROWING NET TOTALS FOR THESE USERS											
		1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908
1 Bakers and flour dealers	12	..	..	..	1	1	1	2	6	9	12	17	42
2 Brewers	31	..	..	3	12	19	34	40	62	77	85	102	113
3 Brickmakers	17	..	..	..	..	4	4	7	12	20	25	32	37
4 Building contractors	14	..	..	..	..	1	3	8	10	31	38	49	56
5 Cabinetmakers, general furnishers, and stores	23	..	..	1	2	7	9	13	19	40	65	106	151
6 Carriers and transport companies	34	..	..	..	..	..	26	64	67	29	179	212	234
7 Gas companies	11	..	..	..	..	..	..	2	3	10	17	27	31
8 Hotels (omnibuses)	16	..	..	..	..	..	..	2	5	7	7	14	20
9 Laundries	12	..	..	..	..	..	..	5	6	13	18	23	26
10 Market gardeners and fruit growers	15	..	..	..	..	..	1	4	10	16	19	20	21
11 Millers	37	..	..	..	5	11	17	24	33	40	52	66	77
12 Mineral water manufacturers	9	..	..	..	..	..	2	3	3	5	9	14	15
13 Municipal and other local authorities	42	..	..	2	6	8	20	32	42	54	73	84	94
14 Provincial omnibus companies (and proprietors of chars-à-banc)	23	..	..	..	..	..	..	7	61	155	205	238	276
15 Quarry owners	12	..	..	..	..	1	3	4	6	10	12	14	18
16 Various manufacturing and other trades	34	..	1	2	2	3	6	10	20	30	37	65	82
Totals	342	..	1	8	28	55	126	227	365	646	853	1083	1293

HARRY N. ALLEN RESIGNED the presidency of the New York Taxicab Co. in February to go abroad for a rest, and H. C. Hoskier assumed the position of acting president. The company is reported to have lost a large amount of money during the strike of taxicab chauffeurs last fall, and Mr. Hoskier is authority for the statement that, contrary to general belief, the company is not making any money on its investment. This he says is due to the excessive mileage that the cabs run without passengers, amounting to an average of twenty-five miles out of forty-eight miles covered daily, and also to breakages due to holes in the asphalt paving.

SOME INTERESTING DATA have been compiled which show comparative costs of horse-drawn and motor-driven wagons, and according to *System* bring out certain advantages of the motor truck. It cost twenty-four owners of ninety-six horse-drawn vehicles $1,392.74 annually for trucking. On a similar total charge basis it cost forty-three owners of ninety-four motor-driven wagons $2,237 a year. In both cases annual expenses for vehicles of all capacities were averaged. Whereas the cost a vehicle-mile and a ton-mile for the horse owners was respectively 20.4 cents and 31.7 cents, the motor car owners paid 16.4 cents a vehicle-mile and 11.7 cents a ton-mile for hauling their goods.

RESULTS OF PANHARD MOTOR WAGON DEMONSTRATIONS

THE New York branch of Panhard and Levassor of Paris, France, has recently delivered to the large New York poultry house of A. Silz a 2-ton chain driven delivery van for use in the city. This vehicle was submitted to a series of exhaustive tests before approval by the buyers. These tests extended for a period from June 9 to November 4 last in actual service. Similar trials were held with another machine of the same type and make for the account of the New York *Herald* from April 14 to July 5.

NEW YORK HERALD TRIALS.	A. SILZ TRIALS.
April 14 to July 15	June 9 to Nov. 4
92 days 13 weeks	148 days 21 weeks
63 actual working days	120 actual working days
4,050 miles	7,323 miles
Average: 64.3 miles per working day	Average: 61 miles per working day

Average cost of vehicles, minus tires...	$3,900.00
Cost of tires	300.00
Depreciation per annum on $3,900.00 at 33 1-3 per cent.	$1,300.00
Depreciation per annum on $300.00 at 50 per cent......	150.00
Total depreciation per annum..................	$1,450.00

Depreciation for 92 days	$365.47	Depreciation on 148 days	$598.79
Fuel, 390 gals. at 14c..	54.60	Fuel, 732 gals. at 14c..	102.48
Oil, 30 gals. at 45c....	13.50	Oil, 63 gals. at 45c....	28.35
Wages, 13 wks. at $25.	325.00	Wages, 21 wks. at $25.	525.00
Total cost	$758.57	Total cost	$1,254.62

Cost per Vehicle Mile.

4,050 miles, $758.57.....$0.187	7,323 miles, $1,254.62....$0.171

Average load carried, taking account of empty runs and occasional overload, 1½ tons.

Cost per Ton Mile.

1½ tons, $0.187.........$0.124	1½ tons, $0.171.........$0.114

We are able to give, in the accompanying table, the results of these tests and the cost of transportation per ton mile which they evidence. The illustration represents the Silz vehicle now plying on the New York streets. The chassis is fitted with a 15-18 horsepower four-cylinder vertical engine located longitudinally under the driver's seat. The wheelbase is 106.50 inches and the tread 58.07 inches. The wheels are shod with large rubber tires, single front and rear.

The body work is of the very highest class and comes up to a standard seldom found in commercial work. The finish is very elaborate, yet sober, in a dark color on which the lining and lettering strike out effectively but not harshly. A remarkable and novel feature advertising the product handled is the provision of a window in each of the main side panels of the body. These windows are closed by deep convex oval glass and are cut the full depth of the woodwork; they contain stuffed game birds hung in a most natural looking position. The uniforms of the driver and attendant are in keeping with the general attractiveness of the vehicle, and the whole gives an impression of "style"; corresponding to the class of trade catered for.

Inspection of the tables will show that the number of working days in each case was very much below the total number of days employed in the trials. This is accounted for by lack of work to be performed. The only mechanical trouble having been encountered in the trials was the short circuiting of the magneto caused by the bursting of a decayed hose connection in the water circulating system. This trouble although little in importance could have been avoided by more careful inspection of the mechanism in the garage.

The figure of 33 1-3 per cent., adopted in the calculation of the depreciation is very conservative, especially considering the skill expected from a $25 a week driver. It reckons on three years as the life of a vehicle and yet the Singer Sewing Machine Company has a wagon of

PANHARD DELIVERY VAN USED BY NEW YORK DEALER IN POULTRY AND GAME

Panhard make which has completed its fifth year of service and is still good for considerable use. The salaries of the drivers were charged against the vehicle for the entire duration of the trials, yet this was hardly warranted as these men were employed in other work during the numerous idle days.

TWO COUPLE-GEAR ELECTRIC TRUCKS HITCHED TO 31-TON LOAD IN NEW YORK

The cost of the vehicle was charged as equal for the two machines for the sake of simplicity, as it includes the cost of the body it should, however, vary according to the maker and to the elaborateness of the fittings.

The average load carried taking into account the empty trips and the occasional overloads was arrived at by consultation with the operators.

HAULING A 31-TON LOAD

The hauling of heavy loads like steel girders, machinery castings, and blocks of stone about the streets of a large city is a problem that taxes the resources of truckmen generally, and when Mr. R. Doughty, of New York, faced the proposition in January of hauling two 25-ton engine castings from the foot of Ninety-sixth street and the East River to the Jacob Ruppert Brewery at Ninety-Second Street and Third Avenue, he decided to see what could be done by motor trucks. A contract was made with the Couple-Gear Co., of New York, to do the work with their four-wheel drive electric trucks, and in order to economize on current consumption, two five-ton trucks were sent.

In order to test the tractive effect of different tires, the trucks were first attached singly to the load; the truck fitted with wooden block tires was unable to secure the necessary traction to move the casting, and the other truck, equipped with Swinehart and Firestone tires, took its place and easily pulled the casting (which had been mounted on a truck weighing six tons) around into Ninety-sixth Street. This represented a total load of 31 tons pulled out of soft ground into which it had been settling for several days, by one truck. The other motor truck was now attached in front of its mate and the trip to the brewery started at 11.55 a. m. In order to avoid some very steep grades in the cross streets, the casting was hauled north to One Hundredth Street, through to Third Avenue, and then south to Ninety-Second Street. Through the cross streets, snow piles had been placed in such a way as to compel the trucks to plow through them, and the asphalt pavement on First Avenue, and in many places on Third Avenue, was covered with mud, which made the hauling heavy; down Third Avenue the grade is 2 per cent. The casting was delivered without any trouble at 1.19 p. m., a total elapsed time of 84 minutes; but as 36 minutes were necessary in which to adjust ropes, block up man-hole covers to prevent their breaking, and the like, the distance, one mile (half of which was up a 2½ per cent. grade) was covered in 48 minutes running time; and a crew of only six men and two motor truck drivers employed.

A few days later the other 25-ton casting was hauled to the brewery by means of a capstan and tackle, the work being started early in the morning and continuing far into the night; Mr. Doughty at the last minute not being willing to risk his horses in the work. As a result of this very conclusive work, an order has been placed for a five-ton truck to be built with motors wound in such a way as to give maximum hauling ability.

RELIANCE MOTOR TRUCK HAULAGE

Interesting results of a 15 days' demonstration of a 3-ton Reliance, two-cycle, gas motor truck for the Merchant's Transportation Company of Washington, D. C., are furnished by the agents of the Reliance company, H. Cornell Wilson & Bro. in that city. The demonstration was recently made in the ordinary course of business of the transfer company:

Freight hauled (car weights), 431,000 pounds at 2c.		$86.20	
Miscellaneous freight		7.50	
General freight deliveries		142.76	
			$236.46
EXPENSE FOR LABOR AND SUPPLIES.			
Repairs	$1.50		
Garage expense	7.50		
Gasoline, 150 gallons	15.30		
Oil, 15 gallons	6.00		
Motor truck expense for 15 days		$30.30	
Driver	37.50		
Helpers on truck	51.00		
Total labor expense		88.50	
			118.80
Net gain for 15 days			$117.66

Interest charges and depreciation not included in the foregoing.

WARD.

ABOUT 150 TAXICABS have been in operation during the past year in Buenos Ayres. The operating company is said to be making a very safe margin of profit.

VEHICLES OPERATE SUCCESSFULLY ON PITTSBURG'S HILLS

H. A. LANE

PITTSBURG has got beyond the experimental stage in the use of commercial vehicles. In fact it may almost be said that there will be no further need here of missionary work along this line. When you can show a Pittsburg business man where he can make $3.00 instead of $2.00, or where he can save $10.00 per week instead of spending $5.00, he is going to go over to your side in a hurry. That is what has brought the commercial vehicle into quite general use in the city of hills and what is going to be the chief factor in rapidly increasing the sales of motor trucks of all kinds.

It was less than four years ago that one or two Pittsburg firms were roundly ridiculed for "trying on" the motor truck. Their competitors and friends alike told them that it would not work on the steep grades of Pittsburg; that it would not carry the loads which it must carry; that the up-keep charges would be altogether too large to be considered with a view to profit; that careless drivers would constantly get the firm into costly troubles and that it would be only a few months at the longest before they would harness their horses again.

A PITTSBURG PIONEER

The Joseph Horne Company, which was a pioneer in the use of commercial vehicles here, now has thirteen motor delivery wagons. The Kuhns, high-class caterers of the East End, were also among the first to experiment with the "foolish" notion. They now have four machines doing duty every day. There are at least fifty commercial vehicles in constant use in Pittsburg at present. Sales the past year exceeded in number the total of the preceding three years and there is every reason to believe that with normal business conditions prevailing in 1909, a large number of trucks and wagons will be sold here during the next twelve months.

That the commercial truck is going to be a prominent factor in the business life of Pittsburg is a fact so well established in the minds of dealers that three new agencies have been installed in Pittsburg during the past year. The Bellefield Motor Company secured the agency for the Rapid and also the Couple-Gear machines. This agency has sold more than a dozen Rapid machines in addition to several of the Couple-Gear vehicles. Many of these trucks were taken by merchants in the prosperous suburbs such as Sewickley, Wilkinsburg and New Kensington. The long hauls to the beautiful estates of millionaire customers made the retail concerns feel the need of trucks for deliveries and they have proven very successful. These cars are built with special reference to hill climbing and in every case have given satisfaction. The trucks will carry from one to seven tons and some of them which have a trailer carry ten or twelve tons at a load. The Pittsburg Malleable Iron Company has the heaviest truck in the list, which, with its trailer, will carry fifteen tons.

VARIOUS VEHICLE AGENCIES

The Maxwell-Briscoe Company also installed an agency about a year ago on Forbes Street for a half-ton truck. The Standard Automobile Company has the agency for the Packard three-ton truck and the Franklin one-half ton wagon, and has made several sales of both. New agencies are being sought this winter as the increase in general demand for commercial vehicles is so noticeable as to make the dealers see that there is money in the business.

In connection with its commercial vehicle business the Bellefield Motor Company last summer ran a "Seeing Greater Pittsburg" bus line on which several buses were used. These were twelve-passenger cars and would carry from sixteen to twenty passengers on a pinch. They made the rounds of Highland and Schenley Parks and gave the passenger a splendid view of the Monongahela Valley steel plants. The usual trip was from ten to fifteen miles and took two hours time; $1.00 was the fare. The experiment was so successful that the company is contemplating putting on additional bus lines next summer.

The Pittsburg Motor Vehicle Company enjoys the distinction of being the only manufacturer of commercial motor vehicles in this city. It manufactures electric trucks ranging in size from one-half ton to three-tons capacity. In simplicity of construction these trucks are unique and everything has been avoided which would make repairing difficult. The trucks are made at the company's plant on Ellsworth avenue, East End. The company's sales last year in Chicago, New York and Boston were very satisfactory and the most encouraging feature is that repeat orders are plentiful. The average cost of maintaining one of these vehicles in Pittsburg has been shown to be about $3.36 per day. This conclusion was reached after one firm's use of a vehicle for three years.

PITTSBURG COMMERCIAL VEHICLE USERS

Among the leading Pittsburg firms which are now using commercial vehicle trucks for delivery purposes are the following: The Joseph Horne Company, thirteen trucks; the Bailey-Farrell Manufacturing Company, two trucks; the Bindley Hardware Company, five trucks; McCreery & Co., one truck; Boggs & Buhl, one truck; Kuhn Brothers, four trucks. Several Pittsburg firms that have been using one or more vehicles for the past year have placed orders for from three to six for 1909. It has been found that a careful chauffeur will drive a good truck over the bad hills and poor pavements of Pittsburg with less monthly expense than the average driver of a one-horse delivery wagon makes. The trucks will hold much more goods, and articles can be kept in a better condition than in the old-fashioned horsed wagon, a point which is not to be overlooked in catering to the wants of high-class customers.

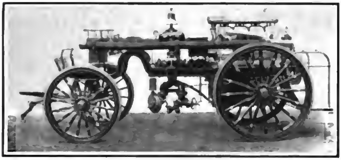
Commenting on the commercial vehicle situation in Greater Pittsburg, an official of the Bellefield Motor Company lately said: "We are making a specialty of commercial vehicles for strictly business reasons. We believe thoroughly in the commercial end of the business. Our experience, with that of other agencies, demonstrates the fact that Pittsburg is a good place for these machines and that the old theory that they could not be made to overcome the grades and hills was a false one. General satisfaction is the rule with customers who have bought our machines and we predict that ultimately the commercial vehicle will be a more profitable seller for dealers than the ordinary automobile."

The Pittsburg Motor Vehicle Company has this to say about the situation: "There is no longer any doubt that the commercial truck will do the work OK on Pittsburg streets. Demand for our machines is increasing steadily and rapidly not only in Pittsburg but also in the large cities all over the country. Indications are that with a good business situation the coming year, the commercial vehicle business is going ahead like a landslide, and we are getting ready to meet the increase in demand by enlarging the facilities of our plant."

GAS MOTOR HORSE-DRAWN MUNICIPAL FIRE ENGINES

As an intermediate step between the horse drawn and the self propelled fire engine there has been developed a horse-drawn machine equipped with a water pump driven by an internal combustion motor. Many machines of this type have been supplied to fire departments, chiefly in small towns and rural districts where the higher cost of the automobile fire engine was considered prohibitive. These machines supplied by American makers have proven much superior in every respect to the steam engines previously used, and as their construction comes well within the range of the motor vehicle engineer our readers will be interested in the description of two typical machines recently put in service.

The engine supplied to the city of Brockton, Mass., by the Westinghouse Company of Schenectady, N. Y., in September, is illustrated herewith. In this the water pump is driven by a four cylinder vertical gasoline motor, built in the Westinghouse shops. This motor is direct coupled to a rotary vane pump delivering 1 gallon of water per revolution of the crankshaft. The pump will lift water from 5 to 25 feet depth without priming, and the flow commences 10 seconds from the moment the operator begins to start the engine. The air chamber to regulate the flow of water is prominent in the engraving above the pump. The vertical disc shaped hose connection below the pump is the water inlet and the Y branch is the delivery pipe to which a wheel actuated churn valve is fitted to regulate pressure and prevent bursting of the hose from too high pressure. All the hose connections are mounted on horizontal ground joints so as to permit of turning them in any desired direction where they can be locked by means of two small hand levers.



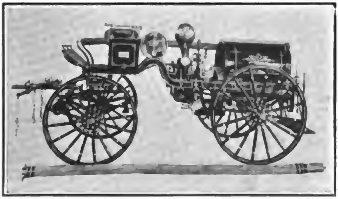
WESTINGHOUSE OUTFIT FOR BROCKTON, MASS.

The frame is of the crane-neck type to clear the front wheel in turning. The rear springs are full elliptics. The front spring is a round coil spring contained in a pocket, one end being rigid with the pocket the other end resting and carrying the load on a ball thrust bearing, which gives a frictionless and flexible fifth wheel arrangement. The wheels are of the Archibald fire department service type, with rims riveted clipped and bolted, the front are 3 feet 8 inches and the rear 4 feet 8 inches. Rubber or steel tires are fitted as desired. A brake pedal on the driver's footboard operates a powerful contracting band brake on the rear wheels.

In the construction of the machine special care had to be taken to secure absolute immunity against the accidents which the vicinity of burning materials might cause through the possible explosion of the gasoline tank. This has been obtained by the provision of a thick asbestos lining around the tank and an external jacket of Russia iron. This fuel tank is located quite low between the rear wheels, under the engine, a pump driven from the engine raises the fuel to a small auxiliary tank above the carburetor; an overflow pipe returns the surplus gasoline to the main tank.

Two horses are used to draw the machine and on account of the lightness and low center of gravity of the vehicle it is claimed that a higher speed is attained than with the three horses usually hitched to the steam engines. A further advantage comes from the fact that there is no waste of time in getting up steam while it is found that the suppression of the boiler and attendant troubles and repairs permits of having the machine constantly ready for work, a quality very much lacking in steam fire engines. The first machine of this type was built by the Westinghouse Co. for service in its home town, and before being accepted by the Schenectady Fire Department, was required to undergo some severe tests. In one of them the engine was placed in a large lot and after the motor was started no one went near the machine for twenty-four hours, though the engine continued to pump 650 gallons of water a minute without a break during the entire test period.

A similar machine and of the same capacity although different in details is the Waterous, made by the Waterous Engine Works of St. Paul, Minn., which we also illustrate. This concern makes engines of a similar description with motors ranging from 1 to 4 cylinders and a water output of 150 to 800 gallons per minute.



WATEROUS GAS MOTOR FIRE ENGINE

The Commercial Vehicle

Vol. IV March 1909 No. 3

Published Monthly by The Commercial Vehicle, Incorporated, at
1402 Broadway, New York City

Cable Address
Comveh, New York

Long Distance Telephone,
425 38th Street, New York

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Chicago, Ill.

Subscription Rates

United States, Canada and Mexico . . . . One Year $2.00
Other Countries in Postal Union . . . . One Year $3.00

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Entered as second-class matter, September 13, 1906, at the post office, New York, N. Y., under the Act of Congress of March 3, 1879.

WANTED, A MOTOR TRUCK SHOW

Looking over the field of the commercial vehicle in the light of its exploitation at the Chicago automobile show, the fact is pressed home that the motor truck has come to the dividing of the ways in its enforced connection with the exhibits of the automobile. The business of the motor-driven vehicle calls for an exhibition worthy of the motor truck. But it is a mistake longer to allow of putting the commercial vehicle exhibit in the shadow of the automobile, with which the motor truck has no shade of interest in common.

Viewed in the light of the best showing possible to the motor truck industry, the fact that it is merely an appendage to the exhibit of the automobile business makes the proposition intolerable. In the best showings that have been made in the past, it is indisputable that the crowds which have made these shows profitable have been drawn by the automobile exhibits. These annual exhibitions of the newest results in automobile building always have assumed something of a society function. Women of wealth and social standing have lent their presence to them. To this extent it has been the "proper thing" for all women to go. Children have been attracted because of this. Anybody with the price of an admission ticket, regardless of the thought of ever purchasing a machine, has been looked upon with favor at the ticket windows.

"Society was out in force last night" has been a characteristic newspaper comment upon such a successful evening and as naturally such a statement is another bid next morning for another social demonstration.

In this way the influence has been to attract to the automobile show a full representation of a city's extravagant classes. As a whole a show of automobiles, attracting large crowds of visitors, merely assembles a class of people representative of the wealth and luxury of the community. They are there to give countenance to extravagance. The man of great wealth having a machine of only last year's pattern, may be there only that he may decide upon another automobile merely because it is up to date. Plaything as the automobile may be to him, it is more expressive of extravagance than of anything else. To-day the modern automobile is an easier, freer outlet for the expenditure of money than is almost anything else that comes within the circle of the home. Thousands of homes, under social pressure, are supporting automobiles which are beyond the power of the head of the house honestly to maintain. Property is mortgaged in order to buy them and debts accumulate in order that the machines may be run.

Thus, in a nutshell, the automobile show stands preeminently as representing an outlet for extravagance, while to the extent which the motor truck has figured at all in them, it has been in the anomalous position of showing to these patrons of the automobile a more or less feeble pointer toward commercial and industrial economies.

We submit that in such an atmosphere as marks the automobile show, this economic side of the commercial vehicle is in ridiculous contrast. It has been in the position of a half dozen Clydesdale draft horses, lined up for exhibition along with a hundred stables of thoroughbred trotters, bred to track and sulky. Who has eyes for the draft horses while the contests are on in the speed ring?

It remains, however, that the automobile has set the custom of the vehicle show. The automobile builder has come out into the exhibition hall, showing his product and demonstrating it. Owners of costly automobiles may be potential purchasers of trucks. If he has bought his pleasure car in this open competition, he is more than likely to ask why it is that the commercial car hasn't offered him the same opportunity for inspection and judgment, based upon a like full representation from the builders.

In this sense the necessity of a proper showing of commercial vehicles has been established by the automobile precedent. Can the builder of the motor truck ignore the situation? Shall he be satisfied, year after year, with burying a few motor trucks in a maze of showy automobiles, dressed for the flashy tastes of extravagance?

Frankly and earnestly we do not believe that he can. We believe that the best interests of the builders of commercial vehicles point to an annual show which shall be representative of the commercial vehicle and its mission in the world. It should be held at a time of year when proper demonstration of the car can be made to the interested inquirer—and under the conditions which we recognize as necessary in such a show, virtually every visitor would be an interested visitor. Social pressure would not be exerted upon him to attend. Economy in the conduct of his business, not the opportunity for wastefulness in his family life, would attract him. Solution of the present tangles of horse traffic in the streets would be the economic lodestone to draw him.

In this respect, too, the idea of a motor vehicle show for profit would have to be relegated to secondary place. Few men pay money to be convinced against their wills. The motor truck builder knows that the horse owner to-day stands at least negatively in doubt. He may pay money willingly to enter the glittering display of an automobile show, where his wife and his children are also entertained, probably by things beyond their reach. But only the practical side of economy in his business will prompt him to spend an evening and his entrance money to look over a display of service trucks, void of the glittering finish of the pleasure car and in settings that comport themselves with the utility of practical displays.

Close upon the heels of the automobile shows of the winter, there is time for the builders of the commercial vehicle to consider this matter in the light of good business. In the early history of blooded farm stock and new farm machinery, the county fair and the State fair played most important roles in publicity. In the business of the automobile manufacturers probably no one questions the enormous benefits that have accrued to the interests advocating the pleasure car. Publicity and convincing demonstration of the commercial vehicle must be recognized as one of the prime necessities at this particular period in its evolution. Shall the builder of the service car dispute the advantages of a representative showing of all that he has accomplished?

But we insist that to attempt to make this showing in the atmosphere that attends the automobile exhibition is a business folly. The commercial vehicle must divorce the automobile in this connection, now and for all time. The two machines are not competitors. They are not even remotely akin in purpose. Let us have the commercial vehicle show, but let it be a show of commercial vehicles, not an overshadowed, buried annex to an exhibition of all that is eloquent of extravagance and ostentatious display.

* * *

SPECIAL EQUIPMENT FOR WORK VEHICLES

There are more than 100 manufacturers actively engaged in the building of motor trucks and delivery wagons in the United States at the present time (to be precise, 103 are paying for subscriptions to The Commercial Vehicle) and every few days the name of some new maker is discovered to be added to the rapidly growing list. Some are making only a few machines a year, while others are turning out several hundred. Already the industry has reached considerable proportions, but they are as nothing compared with the promise for the near future.

Up to the present, design has varied so greatly and the numerical production of any one pattern of machine has been so small that the manufacturers of component parts for motor vehicles have evidently considered it not worth while to go to the expense of making special designs for engines, change speed gears, differentials, and other essential parts to be built into trucks and other vehicles for heavy, rough work. It is only recently that one of the makers of pressed steel frames has brought out a line of special frames for commercial vehicles, notwithstanding the obvious unsuitability of the ordinary light-gauge pressed pleasure car frame for the purpose. Spring makers, who do a large business in heavy springs for drays, coal wagons and other horse-drawn wagons, have always been ready and able to supply special springs of a character suitable for motor trucks but the development of other special parts for commercial vehicles is extremely slow, except in the notable product of one maker of axles and anti-friction bearings and the chain makers.

The same criticism is equally true of the production of special equipment for business wagons, although the makers of such articles as lamps, oilers, batteries, coils, tool boxes, tools, and so on, have not the excuse to fall back upon that truck design has not yet been standardized. The design of the truck has nothing to do with the design of such fittings—that is, a single pattern of lamp, for example, would be suitable for all makes of trucks of a given size, and a coil box, a lubricator, timer, pump, or other attachment that was suitable for one design of heavy truck would be equally applicable for others of the same capacity and motive power. Yet the equipment makers have given almost no attention to this promising field, in which the chief requisites are reliability, durability, simplicity, moderate cost and plain finish.

How incongruous it looks to see a ponderous 5-ton truck engaged in hauling rods and angles of iron and steel, or heavy reels of telephone cable or other rough, heavy materials equipped with the highly polished, brass lamps built for high-speed pleasure cars. Nobody wants to waste time on such a machine polishing brass lamps, and an accidental poke with a piece of the material that is being loaded or unloaded would promptly put the flimsy side light or headlight out of commission. Why does not some lamp maker display enterprise enough to press lamps out of steel for truck work? They should be made as plain as possible, without any fancy rolls and curves, and finished in enamel or japan that will not need frequent polishing. The parts should be riveted together with steel rivets, and even side lamps should have sockets on each side so that forked brackets could be used.

It ought to be borne in mind also by equipment makers that delivery wagons and trucks are necessarily exposed to all kinds of weather every working day in the year, and consequently any battery box, tool box, coil case and similar attachment should be of a character to resist alternate rain and sunshine, heat and cold, and at the same time to stand the rough usage it will inevitably get. Handsomely finished mahogany cases, mortised and glued together and of light construction are obviously entirely out of place on such vehicles. Pressed steel seems to offer the best solution, as it has ample strength, is weather proof, durable and is susceptible of any style or degree of finish, suiting the case for use on trucks engaged in the roughest work or for the richly finished delivery wagons in which many leading retail houses take great pride and look upon as an advertising asset.

Odometers, speed indicators, clocks, horns, gauges, switches—in fact, all dashboard attachments—should be of the simplest and most durable construction and plainest finish and should be protected as much as possible from the elements and from contact with heavy boots and packages.

Unless makers of the present standard lines of accessories are fully satisfied with the pleasure car business they are doing, and are content to allow new manufacturers to step in and supply the commercial vehicle trade with a special line of fittings, it is high time they were bestirring themselves to bring forth some special goods with which to go after this trade.

The foregoing does not apply to those progressive makers of parts and fittings who have already made a special study of the work vehicle problem and to whose invaluable assistance much of the progress in motor truck and wagon construction is due. A majority of these will be found represented in our advertising pages and a careful study of their announcements will well repay the complete vehicle builder, and also the user who has had unsatisfactory service from unsuitable pleasure car equipment.

COMMERCIAL VEHICLE PROGRESS IN WASHINGTON, D. C.

H. G. WARD

DURING the year 1908 commercial vehicles made great headway in Washington, D. C., and the future outlook is full of promise. It is conceded that Washington is an ideal field for the exploitation of the commercial vehicle. The streets for the most part are wide and paved with asphalt, and there is an absence of many steep hills, thus insuring good running conditions. It is a notable fact that during the year many local firms discarded the horse-drawn vehicles for delivery purposes and adopted motor-driven vehicles. Even the Federal and District governments have adopted the commercial vehicle in order to expedite the work of their several branches.

The Adams Express Company has long experimented with commercial vehicles in its delivery and collection service, and these experiments have been so successful that all the horse-drawn wagons formerly used have been replaced with electric trucks. The company has its own garage and charging station, and is getting excellent results from the use of commercial vehicles. Lansden electric trucks are used exclusively by the company, and the way they get about the city under the skilful handling of the drivers is a revelation to many and has served to draw the attention of many other users of horse-drawn vehicles to the possibilities of the motor driven vehicle. The United States Express Company also employs a fleet of electric trucks in its service and like its competitor has entirely discarded horse-drawn vehicles.

DEPARTMENT STORE SERVICE

Wood & Lothrop, who operate the largest department store in Washington, are devoting a great deal of attention to the motor vehicle, and are now using ten electric delivery wagons in their delivery service. They maintain their own garage, and are getting good results. They are gradually eliminating the horse-drawn vehicle from their delivery service.

Probably a hundred business houses of all kinds, including brewers, grocers, bakers, provisioners, florists, and confectioners are experimenting with motor-driven vehicles, many of them having become interested during the past year.

The automobile dealers are gradually awakening to the fact that the commercial vehicle has good selling possibilities, and a number of them are now making a serious effort to interest local business men in the commercial vehicle proposition. The firm of Cook & Stoddard has been the pioneer in promoting the sale of motor wagons and trucks, and has been responsible for much of the good work which has been done; it has made a specialty of Government business. The Pope Automobile Company of Washington has the Autocar agency and is giving a number of demonstrations that are sure to result in sales. H. Cornell Wilson & Co. have the Reliance agency and are on the point of closing several good deals. The Dupont Garage Co. has just taken the agency for the line of the General Vehicle Co., and signalized the event by selling four of these vehicles to Chapin & Sacks, who operate a large ice-cream factory. The latter concern also uses a number of Rapid delivery wagons in its service. The Commercial Automobile & Supply Co. has taken the Studebaker agency and will make a systematic effort to interest local business men in the Studebaker line of electric and gasoline vehicles.

MACHINES IN GOVERNMENT SERVICE

Uncle Sam is gradually acquiring a fleet of commercial vehicles and the near future will see many of the various branches of the Government utilizing them. The Bureau of Standards and the Library of Congress have for several years used electric trucks for carrying mail and other matter to and from the various departments. The War Department has a number of White steamers in use, and the War College uses a Waverly electric delivery wagon. A Studebaker electric truck is used at the Naval gun factory. A Franklin truck is used by the District water department for responding to hurry calls for repairs, and a Knox truck will soon be added for the same purpose.

In the postal service of Washington five Brush package carts and two single-cylinder Cadillacs, with specially-built bodies, are used in collecting mail and are giving great satisfaction.

The new year will witness the introduction of gasoline passenger omnibuses on the Sixteenth Street herdic line, replacing the obsolete horse-drawn herdics.

In conclusion attention is called to the great advances made by the taxicab in Washington. There are three big companies operating taxicabs here and more than a hundred of them are in service.

LONDON CAB DRIVER'S EXPERIENCES

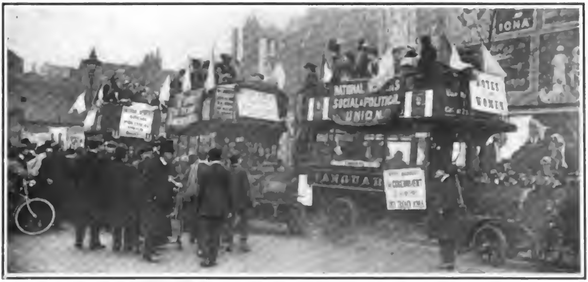
It is becoming the practice abroad to sell motor cabs outright to drivers, payment being usually made on the installment plan. In London second-hand machines are sold to the purchaser upon payment of $250 down and the balance in three years. New machines can now be purchased for $500 at time of sale and the balance on time. The experiences of a London cabby who purchased a new Unic taxicab are furnished by our correspondent in the English metropolis. The owner, J. Brown, of 37 Wakefield Street, W. C., bought the machine in March last:

"Taken from April, this being the first complete month in which the cab worked, results for the following six months show that out of a possible total of 183 working days, the cab ran 171, covering 13,942 miles, giving an average of 82 miles a day for the period noted, and a consumption of 606 gallons of gasoline, which equals 23 miles to the gallon for the whole mileage over 171 days, while pneumatic tires and repairs to same cost $287.75. Driver Brown is somewhat enthusiastic about drivers owning their own cabs, and is naturally well pleased with the results which he has obtained from his excellent machine; he thinks, however, that he might be giving 'too much away' if he were to surrender his small repair bill, or give his gross earnings for publication. In the matter of takings, however, the writer knows him to be in a good position, as during one of his previous jobs he was with a cab company which did a great deal of hotel work, and the proprietors and managers of these now remember him, as he has got his own cab. Soon after Driver Brown got on the road with his new taxi he was chartered by a titled lady for a fortnight at £150 for the period."

LONDON CAB OWNED BY THE DRIVER

MOTOR 'BUS AIDS SUFFRAGETTES

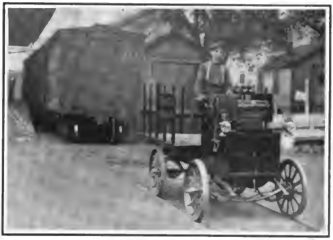
Whatever the merits of the suffragette movement may be the English promoters of the enfranchisement of women are up-to-date in their methods. In their public appearances they have enlisted the aid of the motor vehicle, as the accompanying reproduction of a snapshot made in London shows more clearly than words. In the commanding position of the upper deck of an omnibus the leaders can "demonstrate" to a wide audience and without fear of being run over by any unsympathetic driver of an automobile or horsed vehicle. The drivers of wheeled vehicles have always a respectful regard for the inertia of a loaded 'bus, for in any sort of collision even a street car may come off second best. Then, too the broad spaces of an omnibus's sides give room for printed argument to attract the attention of those out of range of the speaker's voice. There is something of a suggestion here for the managers of the suffragette campaign in New York.



MOTOR 'BUSES EMPLOYED BY SUFFRAGETTES AS AN AID TO PUBLIC DEMONSTRATIONS

FRANKLIN SWITCHING TRUCK

An ingenious and very simple adaptation of the ordinary motor truck to service on tracks is shown in the accompanying illustration of a Franklin truck recently supplied to the Thacker Coal & Coke Company for service at its mines in Pennsylvania. The problem of moving empty or loaded railroad freight cars on tracks and sidings where there is not a sufficient amount of work to warrant the use of a steam locomotive regularly is one that has brought into use many devices, here and abroad. It is a not uncommon sight in a freight yard to see workmen laboriously moving a single car by applying a pinch bar to the wheels. Sometimes horses are used; and abroad, in many places, a costly system of hydraulic capstans is frequently installed for this work. The method here shown is very efficient and costs little to operate, and by substituting ordinary road wheels for the flanged wheels a general utility motor truck is obtainable. The truck is one of the standard Franklin machines, propelled by an air-cooled gas motor.


FRANKLIN TRUCK WITH FLANGED WHEELS

OF INTEREST TO VEHICLE BUILDER AND BUYER

Management of the Thomas Motor Cab Co., of Buffalo, organized by E. R. Thomas for the manufacture and sale of the Thomas taxicabs, has been placed in the hands of Marcus I. Brock, formerly sales manager of the Autocar Co., of Ardmore. The appointment of Mr. Brock to this important position means much for the future development of this special branch of commercial vehicle work, as Mr. Brock is well and favorably known in the trade and is particularly energetic and enthusiastic. He was sales manager of the Autocar Co. from early in 1903 to December, 1905; assistant general manager of the Association of Licensed Automobile Manufacturers for the succeeding two years, and then assumed his former position with the Autocar Co. until the present year. Mr. Brock has also been a member of the Madison Square Garden Show Committee every year with the exception of the last one.

Two ignition specialties are manufactured and sold by the J. H. Lehman Mfg. Co., with office at 170 Broadway, New York City. One of these is the Lehman spark plug, which is so designed as to spark outside of the explosion chamber formed in the plug and to be sootproof and oilproof. The outer electrode is a point on a steel cap that screws into the end of the plug proper, forming a chamber around the end of the porcelain insulation. The plug is provided with two copper asbestos gaskets to prevent leakage of the gases. The other specialty is the Lehman timer, which has a ball bearing contact ring that is given a rolling contact by means of an eccentric motion, so that any point in the circumference of the ring makes contact only once in every twenty-one and a half revolutions, thus materially reducing wear.

Removal of heavy flywheels, gear sets, engines and other parts from truck and delivery wagon chassis is rendered simple and easy by the use of the Hercules portable crane hoist, which is sold in the East by William S. Nicholls, 253 Broadway, New York City. The crane hoist is a compact, movable machine made of angle steel bent to shape and mounted on three iron wheels with roller bearings. The base can be run under the chassis from either side or from front or rear, and the top then projects directly over the piece to be lifted. A windlass is provided on the vertical portion of the crane and suitable blocks, pulleys and cable for raising heavy loads. An iron handle is also provided by which the crane can be drawn about the shop or garage. The Hercules crane hoist is made in eight sizes, with capacity from 500 pounds to 6,000 pounds, all capable of being operated by one man. The lightest one, of 500 pounds capacity, weighs only 180 pounds, the 1,000-pound size weighs 260 pounds, and the standard 6,000-pound size weighs 1,050 pounds. They range in height from 6 ft. 10 in. to 9 ft. and have overhangs varying from 1 ft. 9 in. to 3 ft. 5 in. Where there is much heavy lifting to be done, and there is no machine shop equipment of overhead trolley and hoisting apparatus, such cranes are almost indispensable.

The sales agency for New York City for the Raybestos brake lining—referred to at some length in the Chicago show report in this issue—has been taken by Bettes & Ebsen, distributors of factory, mill and machinists' supplies, located at 62 Reade Street, New York City. Raybestos lining is considered one of the best materials in the market for friction lining for brakes and clutches, and Bettes & Ebsen have been quite successful in supplying the trade.

F. C. Lindoerfer, general sales manager of the Auto-Car Mfg. Co., of Buffalo, recently returned to the factory from an Eastern trip, during which he found the business in commercial vehicles exceeded expectations. A shipment of four carloads of commercial machines, on which the Auto-Car Mfg. Co. has been running its plant day and night for some time, is soon to be made to Boston. A number of the cars in this shipment are 3-ton machines fitted with 6-cylinder 60-horsepower engines. Machines of this type have been considerably sought by the public. The New England agents for the Auto-Car Mfg. Co. are Abbott & Miller, of Boston.

Alfred Reeves, general manager of the American Motor Car Manufacturers' Association, is spending a well-earned vacation in Florida, devoting most of his time to fishing at the Long Key fishing station, which is about 90 miles south of Miami and is noted for the excellence of its kingfish and tarpon fishing.

New Departure self-contained ball radial and thrust bearings, which were so interestingly demonstrated at the New York shows by means of two huge flywheels mounted on a short shaft and revolved around a shaft at right angles to their own direction of rotation, are described in an attractive manner in a catalogue issued by the New Departure Mfg. Co., of Bristol, Conn. In this booklet the method of construction of the bearings and the principles involved are presented clearly and graphically. The various applications of the double-row ball bearings to crankshafts, transmission gears, drive shafts, rear axles, wheel hubs, and so forth, are illustrated.

The Wagner-Field Co., advertising agency, has been moved into larger quarters on the first floor of the Thoroughfare Building, at 1777 Broadway, New York City. M. Worth Colwell, formerly on the editorial staff of the *Motor World*, has joined the literary force of the Wagner-Field Co., and Burr Edward Giffon, formerly with the Bates Advertising Agency, has taken charge of the art department.

After March 1 Firestone tires will be handled in Cleveland by a direct branch house, the Firestone Tire & Rubber Co., of Akron, having leased and remodeled the entire storerooms, basement, etc., at 1918 to 1922 Euclid Avenue, in the heart of the motor vehicle retail section. The new branch will be opened with a complete line of Firestone solid rubber and pneumatic tires, applying equipment and accessories.

RECENT INCORPORATIONS

Taxicab Service Co., at Trenton, N. J., to operate automobiles and other self-propelling vehicles; capital stock, $2,200,000. Incorporators: Winthrop E. Scarritt, Henry K. Picking, and James Mapletoft.

Sightseeing Automobile Co., Richmond, Va., to operate a general transfer and livery business; capital stock, $1,000 to $10,000. John W. Stockton, president; Charles H. Stockton, vice-president; Sallie H. Stockton, secretary, all of Washington, District of Columbia.

Gibb Spring Motor Tire Co., 7514 South Broadway, St. Louis, Mo., to manufacture spring tires and wheels for motor vehicles; capital stock, $100,000. Incorporators: Fred N. Gibb, president; W. L. Green, vice-president; Frank W. Gibb, secretary; W. B. Hughes, treasurer; J. W. Blackwood and H. W. Morrison.

St. Louis Taxicab Co., St. Louis, Mo., to buy, sell and rent taxicabs and other vehicles; capital stock, $25,500. Stockholders: Charles C. James, John M. James and James E. Duncan.

Interurban Auto Bus Co., Albany, N. Y., to operate a motor bus line; capital stock, $15,000. Incorporators: Joseph A. Oaks, Charles O'Brien, Joseph M. O'Brien, James A. Quinn and Daniel T. Casey, of Albany.

Commercial Truck Co., of New York, to manufacture motors, vehicles, machinery, trucks, cars, and so on. Incorporators: C. D. Dean, F. Knowlton and F. R. Marks.

Rockaway Taximeter Car Co., Far Rockaway, N. Y., to operate taxicabs; capital stock, $1,000. Incorporators: E. P. Griffin, P. Murphy and P. Griffin.

Homer Auto Truck Co., at Jackson, Mich., to manufacture motor trucks, drays, delivery wagons and gasoline engines; capital stock, $25,000.

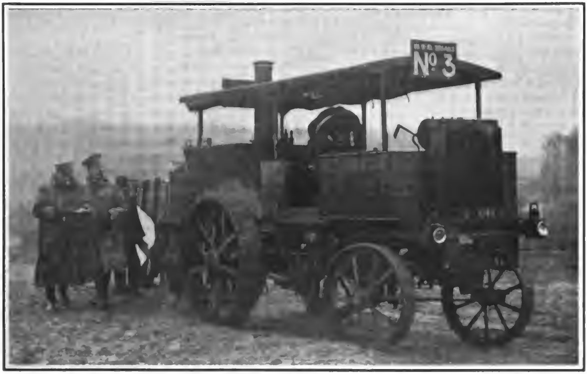
The Commercial Vehicle

Vol. IV April 1909 No. 4

WAR DEPARTMENT TRACTOR TRIALS AT ALDERSHOT

British Military Authorities Conduct a Ten Days' Series of Tests of Steam and Gas Motor Vehicles with Very Satisfactory Results

CONSIDERING only the number of entrants the tractor trials conducted in March by the British War Department were rather disappointing, as but three machines took part. Viewed from the standpoint of work done, however, and having in mind the severe conditions of many of the tests the tractor trials can be said to have been a thoroughly satisfactory demonstration of the motor vehicle for military transport. The trials were conducted at Aldershot, as headquarters, under the supervision of the mechanical transport committee. Two of the machines entered were fitted with internal combustion motors, and the third, shown in the accompanying illustration, was a steamer. The steamer was No. 3, a Stewart, which weighed 6 tons empty. No. 4 was a Thornycroft tractor, weighing 6 tons with fuel tanks empty, and No. 10 was a Broom & Wade tractor weighing a few pounds over 5 tons. The Stewart steamer used coal as fuel and the Thornycroft and Broom & Wade used heavy oil.



SNAPSHOT OF THE STEWART STEAM TRACTOR TAKEN DURING THE ALDERSHOT TRIALS

The trials included a great variety of tests to ascertain the drawbar pull, the ability to run free on the road, and manœuvre on rough ground, to climb stiff grades, to drive through marshy spots and to haul loaded trailers under regular working conditions.

The rules limited the vehicles to a total weight of 7 tons, and provided that each machine should be capable of traveling a distance of 100 miles without taking on any supplies after starting. During the trials, considerable use was made of the winding drums, with which the tractors were fitted, to get out of bad places. No very high speeds were attempted; the highest average for any of the machines being attained by the Thornycroft tractor—6.68 miles per hour during a 10-mile run.

The tractors were of very workmanlike design and all were fitted with steel wheels, the driving wheels being of the built-up type of wide face and with cleats on the face according to regular British traction engine practice. The Stewart machine was fitted with a horizontal two-cylinder compound steam engine, rated at 50 horsepower. This engine had poppet valves, operated by a camshaft driven by bevel gears from the crankshaft. It was fitted with a two-speed gearset of the planetary type. The boiler was of the locomotive type, with superheating coils. The Thornycroft machine was fitted with a four-cylinder 50-horsepower gas motor, driving through a multiple disc clutch to a selective, sliding gear, change-speed mechanism and gear drive to the rear axle. The Broom & Wade machine was of an entirely different type, more resembling an ordinary commercial vehicle as the gas motor was mounted beneath the frame and the covered body had a carrying capacity of 6 tons. The motor had a single cylinder 8 1-2 inches in diameter and 8-inch stroke, developing 30 horsepower at 800 revolutions per minute. A change speed gearset giving three forward speeds, with gears always in mesh, was connected to a differential countershaft by a Renold roller chain. Spur gears on this countershaft meshed directly with gears attached to the rear wheels. The teeth of these driving and driven gears were unusually long so as to allow for play of the rear springs without the teeth coming out of engagement. The method of burning heavy oil in this tractor was interesting. The fuel was fed into the cylinder through a vaporizer, together with only a small amount of air; the remainder of the air necessary for proper combustion being admitted into the cylinder when the piston was near the end of its suction stroke. At the same time as this air supply was admitted a jet of water was injected for the purpose of preventing pre-ignition, as the compression reached 95 pounds per square inch.

The absence of other competing machines was due entirely to the short notice which had been given by the authorities, so that it was impossible for several of the makers to have vehicles completed and tried out in time for the trials. The brevity of the notice is understood to have been caused by financial considerations having nothing whatever to do with the mechanical features of the trials.

GERMAN HEAVY VEHICLE TRIALS

A series of international commercial vehicle trials is to be held in Germany from April 26 to May 3, inclusive, under the auspices and management of the Automobile Club of Germany and the Syndicate of Germany Automobile Manufacturers.

Competing cars will be divided into the following classes: Class 1, 8 to 14-passenger omnibuses; Class 2, omnibuses for more than 14 passengers; Class 3, delivery wagons of 1,100 to 3,600 pounds' capacity; Class 4, trucks of 3,601 to 400 pounds' capacity; Class 5, trucks of 4,401 to 7,700 pounds; Class 6, trucks of more than 7,700 pounds; Class 7, motor trains having one or more cars.

On April 23 and 24 the vehicles will assemble in Berlin and be received and the operators given instructions. On April 25 the cars will be exhibited in the Berlin Exhibition Hall, and following that date they will cover the following itinerary, with stops of one day each for exhibition purposes at Dusseldorf, Strasburg and Stuttgart:

Berlin to Dessau; to Nordhausen, to Cassel; to Bielefeld, to Dortmund; to Dusseldorf; to Coblenz; to Frankfort; to Kaisersluatern; to Saarbrueck; to Strasburg; to Freiburg, to Carlsruhe; to Stuttgart.

The longest stage will not exceed 125 miles for the first three classes of vehicles, nor more than 90 miles for the heavier machines. The average hourly speed called for in classes 1, 2 and 3 is 15½ miles; for classes 4 and 5, 11 miles; for class 6, 9 miles and for class 7, 7½ miles.

RULES FOR WINNIPEG TRACTOR TRIALS

The second series of agricultural light motor competitions in connection with the Winnipeg Industrial Exhibition will be held from July 9 to 17, inclusive, next summer. Entries must be made before June 1, accompanied by a fee of $5 for each machine and a specification giving full description of tractor, including the bore and stroke of cylinder, size of driving pulley and speed, size of wheels, brake and rated horsepower, fuel and water capacities (in cubic inches), class of fuel used and selling price f.o.b. Winnipeg.

Entries will be divided into four classes: 20-brake horsepower and less, 21 to 30 b.h.p., more than 30-brake steam engine h.p., and 75 b.h.p. and under.

Gold, silver and bronze first, second and third prizes will be awarded in each class, and a championship prize will be awarded to the machine gaining the largest number of points considered in conjunction with its suitability for general farm purposes.

No restriction is placed upon the class of engine nor on the fuel used further than that the latter shall be such as can be readily procured in Canada.

All engines entered must be on the exhibition grounds by Tuesday, July 6. The tests will comprise plowing, hauling, belt driving, and brake test. The plowing competition takes place on July 13 and 14.

Entry blanks and copies of the rules and conditions can be obtained by addressing Prof. A. R. Greig, Engineer in Charge, Manitoba Agricultural College, Winnipeg.

Very successful trials were held under the same auspices and management last summer, and the best prizes were won by the Flour City traction engine, made by the Kinnard-Haines Co., of Minneapolis, and the International Harvester Co.'s farm traction engines.

The 1908 trials were international in character, as British machines competed with those of American build. It would add to the interest to have other nations represented.

RECORD MADE BY SAFIR TRUCK

Visitors to the commercial vehicle show at Chicago in 1907 will recall the foreign truck chassis, built at the Safir factory in Zurich, Switzerland, under license from Adolph Saurer, which was exhibited by the Commercial Motor Car Company of New York. This machine had previously won honors in an international competition held at Berlin. At the close of the Chicago show the machine was used for demonstration work in that city and subsequently performed the same service in New York, being finally purchased and put into the service of Schwarzenbach, Huber & Co., silk manufacturers of New York City and West Hoboken, N. J. Since that time it has been running regularly and has covered about 18,000 miles. The load carried varies, sometimes reaching a maximum of five tons and the daily mileage averages from 40 to 75 miles. Mr. A. J. Slade of the importing company informs us that the truck has been laid up for readjustments and repairs only twice since it went into service. The replacement of worn parts has included two engine connecting rod bearings, new driving chains and new front tires; the latter were replaced for the first time at the beginning of this year. The rear tires are the same set put on the machine when it originally went into service.

SAFIR TRUCK WORKING IN DEEP SNOW

The accompanying illustration shows the machine as it was being operated during a recent snow fall. It is the regular Saurer standard chassis, equipped with springs and tires for five ton loads, and is identical with all the other Saurer trucks which have been imported into this country during the past twelve months. Some of these machines are operating in the service of the Emerson Drug Company, Baltimore, Md.; Merck and Company, manufacturing chemists, New York and Rahway, N. J., and the White Plains and New York Merchants Express Company. Mr. Slade states that the expense of operating these trucks, including interest on investment, depreciation, maintenance, fuel, driver's wages, insurance and storage does not exceed $12 a day.

PROPER CARE OF TIRES

The following pointers on how to prolong the life of truck and delivery wagon tires are from the new catalogue of the Diamond Rubber Co. and should be committed to memory and put into practice by all users of such vehicles and superintendents of garages:

The size of tire desirable depends on the weight of the load it is to carry. It is economy to use ample sizes.

If wheels or axles are out of true, excessive and unnecessary wear upon the tires occurs at once. This point is worth watching.

Very sudden starting or stopping of a heavy loaded vehicle exerts a heavy strain upon the tires and should be avoided.

A careful driver, avoiding car tracks and choosing the best roadway, will obtain far greater tire service than the careless one who, if indifferent to tire results, is apt to be equally indifferent to the service the car itself gives.

Proper lubrication of the car lightens the work of the tires, and improper or insufficient lubrication increases it.

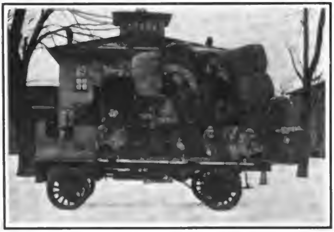
Wire mesh base tires should be handled with some care when off the wheels, as by extremely rough usage it is possible to bend the wire mesh in the tire base in such a way as to reduce its efficiency.

Grease and oils should at no time be allowed to come in contact with rubber tires of any description. They are destructive.

Do not expose rubber tires to great heat. Tires not in use should be kept in a reasonably cool place, not directly exposed to the rays of the sun.

TESTING AMERICAN MOTOR TRUCKS

The severe tests to which American gas motor trucks are subjected before they are shipped to customers is illustrated in the accompanying reproduction of a photograph of one of the five ton machines loaded with heavy bales. The total load, as a matter of fact, is greatly in excess of the rated capacity of the machine. In this particular instance those who are skeptical about the behavior of a heavy motor truck in snowy weather would have been very pleasantly surprised had they witnessed the ease with which the machine was driven about the streets of Lockport, N. Y.—where the American trucks are built—climbing some rather stiff grades and turning corners with the greatest ease. A wide variety of road surfaces is easily available; town conditions exist in Lockport, country roads outside its limits, and city pavements in Buffalo, a few miles away.



TRYING OUT AMERICAN TRUCK IN LOCKPORT

ELECTRIC VEHICLE CONSTRUCTION AND OPERATION—IV

Discussion of the Storage Battery as Used for the Propulsion of Electric Commercial Vehicles—Components of the Cell and Their Functions—Differences Between Plante and Faure Types—Specific Gravity and Thermometer Scales

LOFTUS G. COADE

STORAGE battery engineering enjoys a field peculiarly its own in that it is different almost in every sense of the word from other branches of the mechanical arts, and really belongs to the sphere of the chemist. Here we have a very different combination of elements from those that compose a gas motor or an electric generator. In the first place lead is one of the most difficult of all metals to handle and for this reason all joints must be fused together; in addition to this we have no means of physically knowing whether everything is in good condition without applying tests to assure ourselves that the battery is in proper order. In view of these facts, coupled with the fact that it is possible to ruin a battery with a very few charges improperly applied, the manufacturers, in their own as well as the customer's interest, issue instruction books describing the main points to be followed in order to get the best results. It follows reason that the manufacturers must know more about their own product than anyone else; as the best of them expend considerable sums of money yearly in investigating and developing their product, such experimenting had better be left to them. So in this article the discussion will be confined to a general outline of the subject, explaining some of the terms found in the instruction books with illustrations of various tests. And as the lead battery so far is the one in universal use, the discussion will be confined to that type alone.

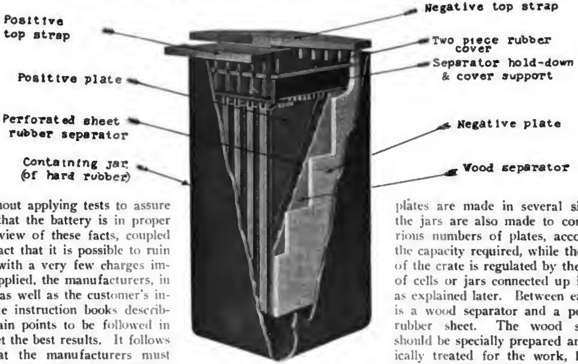


FIG. 1—EXIDE BATTERY CELL

THE LEAD BATTERY CELL

Fig. 1 represents one cell of a storage battery used extensively for the propulsion of trucks, part of the case being cut away in order to show its construction more clearly. This is of the Faure type with pasted plates, and consists of the following elementary parts: Positive plates, negative plates, separators, straps, jar, covers and connectors. The plate consists of a frame or grid of lead alloy, having vertical bars, and horizontal rods of small area across each side of the plate. The cross rods on one side being spaced midway between those on the other side, which is termed "staggered," and the object of which is to hold the paste firmly in its place. When these grids are filled with a paste of lead oxide the mixture sets hard like cement, and then they are given a special electro-chemical treatment in order to form them ready for use. Each plate has a lug projecting on the top which fits into a hole in the strap, and the joint or union is made integral by burning one onto the other. These plates are made in several sizes, and the jars are also made to contain various numbers of plates, according to the capacity required, while the voltage of the crate is regulated by the number of cells or jars connected up in series, as explained later. Between each plate is a wood separator and a perforated rubber sheet. The wood separator should be specially prepared and chemically treated for the work, having a series of narrow grooves cut down vertically on one side, the other side being left smooth. The object of these grooves is to provide for circulation of the electrolyte and to allow for the escape of gases which form towards the end of the charge. The flat side of the separator is placed against the negative plate, while on the grooved side, and between it and the positive plate, is placed a thin sheet of rubber perforated with a number of small holes. Its function is to protect the wood from oxidizing or the rotting action of the positive plate and to hold the paste in place against the washing action due to the circulation of the electrolyte, while the holes allow the free access of the latter to the plate.

The order of these elements in a battery cell would be as follows: First, a negative plate and then a wood separator (flat side); then a rubber sheet; then a positive plate; rubber sheet; wood separator (grooved side); negative plate; and so on, all the positive lugs on one side being burned to a strap and the negative lugs on the other side to the negative top strap. In a cell there is always one more negative plate than positive, and for this reason at each end there is a negative face against the side of the rubber containing jar which does no work. To allow for the greater wear in the positive it is made a little thicker than the negative.

The electrolyte consists of dilute sulphuric acid, which completely covers the plates.

The jar or container is made of hard rubber about 1-8 inch thick, having, at the bottom, bridges or ribs, which support the plates, etc., and allow for a trough to hold the sediment, which falls off the plates—clear from them or it would short-circuit and quickly destroy them.

USUAL PLATE FOR TRUCKS

For trucks, the usual plate of this type is the "MV," which is rated at 7 amperes per positive plate, for a four-hour discharge, and the total number of plates in each cell varies from 7 to 21, though the average would be about from 13 to 19, according to the size of the truck, mileage, and other conditions. These plates are 8 5-8 inches high and 5 3-4 inches wide. The voltage required at the terminals depends upon the number of cells connected up in series; as previously stated, this will vary from 32 to 42 or in some cases 44, the latter limit being determined by the supply voltage. Fig. 2 shows a crate containing the rubber jars with the end straps bolted to the terminals, and Fig. 3 shows four crates of another type of battery connected up; two halves in series, four leads from these being brought to the controller.

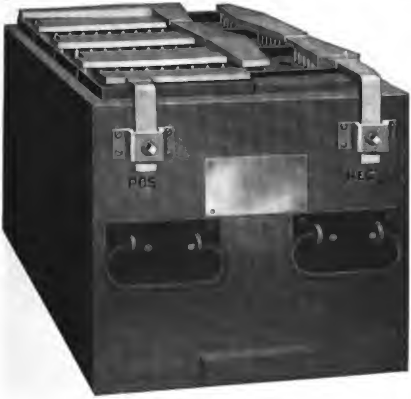


FIG. 2—EXIDE VEHICLE BATTERY

In a former article it was stated that the storage battery, or secondary battery as it is sometimes called, does not really store electrical energy; but that certain chemical changes are brought about in the material composing the positive and negative plates and solution, by connecting a cell containing the same to a source of electrical energy, and that after a certain period of time, on breaking the circuit, the cell becomes capable of giving out electrical energy to some 75 per cent. to 90 per cent. of the energy originally put into it.

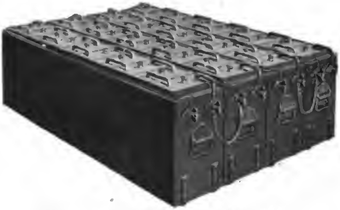


FIG. 3—WESTINGHOUSE VEHICLE BATTERY

Such was the substance of Gaston Plante's discovery in 1861. He employed two sheets of clean metallic lead rolled round a wooden cylinder and separated from one another by a strip of felt soaked in a solution of sulphuric acid at about 10 degrees Baumé, then they were electrically "formed" by repeatedly charging, first in one direction and then in the other, until they were covered with active material, when they were ready for use. Now although at this late day the chemical theory of the battery is not thoroughly understood, and is thought to afford large fields for scientific research, the commonly supposed action is as follows: The positive plate during *charge* absorbs oxygen gas, turning a brown color (Peroxide of Lead PbO_2) during the process, while the negative is reduced by the hydrogen changing to a dull gray or slate color—spongy lead. When the battery is fully charged and the negative plate unable to absorb any more hydrogen, the latter gas is set free by the action of the current on the water and rises to the surface of the liquid, making it appear cloudy or boiling, which condition is commonly termed *gassing*. The acid or electrolyte will now become considerably denser, which condition will be indicated by the use of a hydrometer.

CONDITIONS DURING DISCHARGE

When the cells are fully charged, energy may be drawn from them in accordance with the manufacturer's instructions; the positive-plate parts with some of its oxygen, and being gradually reduced to a lower oxide of lead is attacked by the sulphuric acid, forming lead sulphate, $PbSO_4$, while the negative plate gives up some of its hydrogen and is also gradually attacked by the acid forming lead sulphate, too. Meanwhile, the density of the electrolyte has become less, owing to the formation of water from the H_2O set free from the plates. This formation of a film of sulphate on both plates brings them both to a state of balance, and the electromotive force of the battery will fall in proportion to the amount of sulphate abstracted from the acid until only water is left. In practice, in this operation, which is termed *discharge,* the voltage should not be allowed to drop below 1.7 volts, for the reason that the excessive sulphate is almost impossible to remove entirely, and as it is to some considerable extent an insulator it causes a lowering of the voltage of the cell. When discharged the plates will be found to have changed their color somewhat again, both becoming of a lighter shade. On charging again, both plates give up their sulphate, which returns to the acid, increasing its density to its normal condition as before—the positive plate becoming lead peroxide and the negative, spongy lead, until the cell is fully charged, when it commences to gas again. This series of operations might aptly be termed the battery cycle.

Perhaps this might be better represented in the form of an equation, thus:

Positive plates	Electrolyte	Negative plates
	BATTERY FULLY CHARGED	
PbO_2	H_2SO_4 Sp Gr 1.275 (Strong)	Pb
	HALF DISCHARGED	
$PbO_2 + PbSO_4$	H_2SO_4 Sp Gr 1.240 (Medium)	$Pb + PbSO_4$
	FULLY DISCHARGED	
$PbSO_4$	H_2SO_4 Sp Gr 1.180 (Weak)	$PbSO_4$

Where PbO_2 represents the chemical symbol for lead peroxide or dioxide.

Where $PbSO_4$ represents the chemical symbol for lead sulphate.

Where H_2SO_4 represents the chemical symbol for sulphuric acid.

TYPES OF BATTERY IN USE

There are two distinct types of batteries in general use at the present day, the Plante, previously referred to, being made from sheets of pure lead and formed electrically, and the Faure type, which was brought out by another Frenchman named Camille Faure some 20 years after Plante. In the Faure type the active material is applied to the surface of the plates in the form of a paste, it being claimed by the inventor that this method shortened the time of forming the plates considerably, thus lowering the cost of production, as well as increasing the capacity. Since then, however, various improvements have been made in the Plante plate, forming the plates with an electrolyte of nitric instead of sulphuric acid; in addition to this the surface of the plate has been increased some 25 to 30 times over by grooving, or forming it up from strips of lead ribbon, etc., and which has brought this, the original Plante type, to a high state of efficiency of late years. However, as the two types, each by their own processes, arrive at the same end, producing lead peroxide on one plate and spongy lead on the other, the methods of caring for each, with a few exceptions, are very similar.

SPECIFIC GRAVITY

The specific gravity of a substance is its weight as compared with an equal volume of pure water at a standard temperature, usually 60 degrees Fahrenheit. While there are several methods of obtaining the specific gravity or density of liquids, the general and easiest way is by the hydrometer method. The hydrometer is usually made of glass, and consists of three parts: (1) the upper part, a gradulated stem or fine tube of uniform diameter; (2) a bulb, or enlargement of the tube containing air; and (3) a small bulb at the bottom, containing shot or mercury, which causes the instrument to float in a vertical position when immersed in the liquid. The graduations are figures representing either specific gravities or the numbers of an arbitrary scale, as in Baumé's, Twaddles', or others. There is, however, a tendency of late to discard all hydrometers with an arbitrary scale and use only those which read directly in terms of specific gravity.

Baumé's hydrometer and specific gravities compared are given in the following table:

AMERICAN STANDARD

For liquids heavier than water,

$$\text{Sp. Gr.} = \frac{145}{145 - {}^{\circ}\text{Bé}} \text{ at } 60^{\circ} \text{ F.}$$

Baumé	Specific Gravity	Baumé	Specific Gravity	Baumé	Specific Gravity
0.0	1.000	17.5	1.137	35.0	1.318
0.5	1.003	18.0	1.141	36.0	1.330
1.0	1.006	18.5	1.146	37.0	1.342
1.5	1.010	19.0	1.150	38.0	1.355
2.0	1.014	19.5	1.155	39.0	1.367
2.5	1.017	20.0	1.160	40.0	1.381
3.0	1.021	20.5	1.164	45.0	1.450
3.5	1.024	21.0	1.169	50.0	1.526
4.0	1.028	21.5	1.174	55.0	1.611
4.5	1.032	22.0	1.178	60.0	1.705
5.0	1.035	22.5	1.183	65.0	1.812
5.5	1.039	23.0	1.188	70.0	1.933
6.0	1.043	23.5	1.193	...	....
6.5	1.046	24.0	1.198	...	....
7.0	1.050	24.5	1.203	...	....
7.5	1.054	25.0	1.208	...	....
8.0	1.058	25.5	1.213	...	....
8.5	1.062	26.0	1.218	...	....
9.0	1.066	26.5	1.223	...	....
9.5	1.070	27.0	1.228	...	....
10.0	1.074	27.5	1.234	...	....
10.5	1.078	28.0	1.239	...	....
11.0	1.082	28.5	1.244	...	....
11.5	1.086	29.0	1.250	...	....
12.0	1.090	29.5	1.255	...	....
12.5	1.094	30.0	1.260	...	....
13.0	1.098	30.5	1.266	...	....
13.5	1.102	31.0	1.271	...	....
14.0	1.106	31.5	1.277	...	....
14.5	1.111	32.0	1.283	...	....
15.0	1.115	32.5	1.288	...	....
15.5	1.119	33.0	1.294	...	....
16.0	1.124	33.5	1.300	...	....
16.5	1.128	34.0	1.306	...	....
17.0	1.132	34.5	1.312	...	....

Figure 4 shows a good type of hydrometer enclosed in a protective tube of glass, with a rubber ball affixed to the top, so that all that is necessary is to insert the lower end of the tube into the cell and relax the hand pressure on the ball, when the liquid will rise in the glass tube and cause the hydrometer to float and indicate the specific gravity. In using the hydrometer it is necessary to hold the instrument in a vertical position, or the hydrometer is likely to come in contact with the wall of the protective tube and give an incorrect reading.

THERMOMETER SCALES

As there are two scales in general use, it will be well to describe the relations between the two. In the Fahrenheit thermometer the temperature of melting ice is taken at 32 degrees and boiling point at 212 degrees; thus there are 180 degrees between the two extremes. Now, in the Centigrade thermometer the distance between these two points on the scale is divided into exactly 100 degrees. So in order to convert degrees Fahrenheit into degrees Centigrade: Substract 32, multiply the remainder by 5, and divide by 9. Thus, convert 158 degrees Fahrenheit to degrees Centigrade:

$$\text{Then } (158 - 32)\frac{5}{9} = 70^\circ \text{ Cent.}$$

Or, to convert degrees Centigrade into degrees Fahrenheit: Multiply by 9, divide by 5 and add 32. Thus, convert 70 degrees Centigrade into degrees Fahrenheit:

$$\text{Then } \left(70 \times \frac{9}{5}\right) + 32 = 158^\circ \text{ Fahr.}$$

Herewith is a table giving the equivalent degrees of these two scales from 1 Centigrade to 100:

Cent.	Fahr.	Cent.	Fahr.	Cent.	Fahr.
0	*32.0	35	95.0	70	158.0
1	33.8	36	96.8	71	159.8
2	35.6	37	98.6	72	161.6
3	37.4	38	100.4	73	163.4
4	39.2	39	102.2	74	165.2
5	41.0	40	104.0	75	167.0
6	42.8	41	105.8	76	168.8
7	44.6	42	107.6	77	170.6
8	46.4	43	109.4	78	172.4
9	48.2	44	111.2	79	174.2
10	50.0	45	113.0	80	176.0
11	51.8	46	114.8	81	177.8
12	53.6	47	116.6	82	179.6
13	55.4	48	118.4	83	181.4
14	57.2	49	120.2	84	183.2
15	59.0	50	122.0	85	185.0
16	60.8	51	123.8	86	186.8
17	62.6	52	125.6	87	188.6
18	64.4	53	127.4	88	190.4
19	66.2	54	129.2	89	192.2
20	68.0	55	131.0	90	194.0
21	69.8	56	132.8	91	195.8
22	71.6	57	134.6	92	197.6
23	73.4	58	136.4	93	199.4
24	75.2	59	138.2	94	201.2
25	77.0	60	140.0	95	203.0
26	78.8	61	141.8	96	204.8
27	80.6	62	143.6	97	206.6
28	82.4	63	145.4	98	208.4
29	84.2	64	147.2	99	210.2
30	86.0	65	149.0	100	†212.0
31	87.8	66	150.8	..	....
32	89.6	67	152.6	..	....
33	91.4	68	154.4	..	....
34	93.2	69	156.2	..	....

* Freezing point

† Boiling point.

It will be noticed that for each degree Centigrade the Fahrenheit scale rises 1.8 degrees, so that if we multiply the degrees Centigrade by 1.8 and add 32 we will get the equivalent number of degrees Fahrenheit. In the Fahrenheit thermometer the freezing and boiling points of water are taken at the mean atmospheric pressure at the sea level, 14.7 pounds to the square inch.

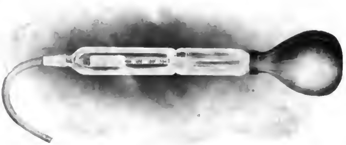


FIG. 4—HYDROMETER FOR TESTING ELECTROLYTE

PROGRESS IN PUBLICITY

"Trucking and Delivery with Electric Vehicles" is the general title of a series of pamphlets that the General Vehicle Co., of New York City, has begun to issue in a suitable form for placing in flexible binders. The pamphlets or bulletins are 8 by 10½ inches and are perforated on the left edge for threading in the binder. The intention is to issue the bulletins (which are of four pages each) one at a time, taking up consideration of the subject systematically. The first one appeared last month and dealt with "The Problem and the Solution." In it are considered briefly and in a practical way the factors entering into the problem of trackless transportation as they affect the merchant and the item of cost involved in the use of electric trucks and delivery wagons. This first bulletin concludes with a table of specifications that is a model of its kind and worthy of being followed by other compilers of catalogues. Instead of embracing a lot of details regarding mechanical construction, which the merchant does not understand or care about, it gives in a space 4½ by 2 inches, the salient characteristics of the six models of electric vehicles built by the General Vehicle Co. regarding which the purchaser may be expected to wish to be informed. This table gives the speed in miles per hour and the mileage travel on one charge for the 350-pound, 1,000-pound and 2,000-pound delivery wagons and the 2-ton, 3½-ton and 5-ton trucks, and also gives in inches for each model the wheelbase, gauge, overall length, overall width; the width, length and height of clear loading space, and the height from the ground of the platform when loaded.

The second bulletin illustrates and describes briefly and in plain, every-day language the running gear and power plant of the G. V. electric vehicles. Successive bulletins to be issued will take up discussion of the various models and the work they are designed to do. Thus the recipient is almost sure to find in the series one type of vehicle that will suit his needs; and the company can at any time mail any single bulletin of the series to an inquirer for a particular type and size of machine.

The General Vehicle Co. is also getting out a brief instruction book for the operation and maintenance of electric vehicles, which is simple, direct and does not confuse by telling too much. It will be a booklet such as should be in the hands of every person who operates or cares for an electric machine, for even the expert engineer sometimes needs a reminder.

COMMERCIAL VEHICLE DISPLAY AT THE BOSTON SHOW

FROM a commercial motor vehicle viewpoint, the automobile show held in the Mechanic's Building, Boston, Mass., in March, was by far the best ever held in the Hub. There were fifteen exhibitors of work vehicles, showing thirty-seven complete machines and ten chassis. The arrangement of space was the best at any show this season. Appreciating the importance of this rapidly growing industry, Manager Chester I. Campbell had devoted almost the entire basement of the building to the work vehicle, and in place of a mass of showy decorations all such were plain but attractive as befits the surroundings of the motor truck. Many of the stands were well arranged, but exhibitors would do well to consider that much room should be allowed in which to view the trucks on all sides and not compel the interested purchaser to climb over wheels or chassis to examine various points. The Rapid company displayed the largest number of vehicles and their arrangement was ideal, but the use of a phonograph in this booth, to attract attention by rendering musical selections, defeated its own purpose by bringing a large number of people not seriously interested in motor transportation who felt in duty bound to ask many questions before leaving.

New England has always proved a very good field for motor truck sales and the amount of interest displayed in the subject at the various stands was really remarkable; this condition is in a great measure caused by the really good salesmen representing the manufacturers in this section, Boston particularly. Many makers who had never exhibited in automobile shows before, displayed their vehicles and a brief description will be of interest. The American Locomotive Co., of Providence, R. I., displayed a 3-ton express truck recently sold to the Armstrong Transfer Co., of Boston. This vehicle is equipped with a four-cylinder, 28-30 horsepower water-cooled motor which is placed beneath the driver's seat in the usual way, and through a multiple disc clutch the power is transmitted through a selective type of change speed gearset, giving three speeds forward and reverse to the rear wheels by means of double side chains from a counter shaft. Expanding brakes act upon the rear wheels and the differential gears are provided with a locking device. Solid tires are used on the wheels, those on the rear being of the dual type.

The Chase Motor Truck Co., of Syracuse, N. Y., showed one of their new two-cylinder air-cooled, two-cycle motors mounted upon a 500 pound chassis, and a complete 1,000 pound covered delivery wagon. Both of these vehicles use a planetary change speed gearset and double side chain drive to the rear wheels. The motors are 10 and 15 horsepower respectively, and the wheels are high and fitted with solid rubber tires. Holsman Automobile Co., Chicago, Ill., had its latest high wheel delivery car of 1,000 pounds capacity exhibited in the booth of the General Automobile Co. This machine has a double opposed air-cooled motor suspended below the body, and by the means of friction belts any desired speed is given to the rear wheels. The well-known Knox company displayed its first piece of fire apparatus equipped with a three-cylinder pump, having a capacity of 650 gallons a minute. This is suspended below the rear axle and is operated by the motor which drives the truck. The power is transmitted through a long shaft fitted with a spur gear meshing with another gear slidably fitted upon the main drive shaft back of the flywheel; the operation of the sliding gear is controlled by a special lever at the side of the driver. In addition, the truck is fitted with a turret pipe and large hose compartments. One of the new motors as used in the Frayer-Miller truck was displayed in the booth of the D. P. Nichols Co. The well-known firm of Panhard & Levassor had one of their 2-ton express trucks on exhibition. This truck has a four-cylinder 15-20 horsepower motor, multiple disc clutch, four speed and reverse sliding gearset and double side chain drive, with brakes operating on both the counter shaft and rear wheels. The use of steel wheels manufactured by the Indestructible Steel Wheel Co. was very noticeable.

Following is a detailed list of the exhibitors and of the machines they displayed:

American Locomotive Co., Providence, R. I.: 3-ton express truck.

American Motor Truck Co., Lockport, N. Y.: 1-ton delivery wagon, 3 1-2 ton spring water bottle wagon, 5-ton chassis.

Autocar Co., Ardmore, Pa.: 1-ton package truck, covered top; 1-ton covered express truck, 1-ton panel delivery truck.

Auto Car Manufacturing Co., Buffalo, N. Y.: 1,500-pound delivery wagon, 1-ton express truck, screen sides, 1-ton covered express truck, 3-ton chassis, with special six-cylinder motor: six-cylinder motor, 60 horsepower.

Chase Motor Truck Co., Syracuse, N. Y.: 500-pound chassis, 1,000-pound delivery wagon.

Commercial Truck Co. of America, Philadelphia, Pa.: 1,000-pound, shaft drive, electric wagon.

General Vehicle Co., Long Island City, N. Y.: 350-pound package car, 1,000-pound panel delivery wagon, 1,000-pound top wagon, 1-ton bank truck, 2-ton chassis, 3 1-2-ton chassis.

Gramm-Logan Motor Car Co., Bowling Green, Ohio: 1,500-pound delivery car, 3,000-pound, covered top, express truck, 3-ton chassis.

Holsman Automobile Co., Chicago, Ill.: 1,000-pound high-wheel delivery wagon.

Rapid Motor Vehicle Co., Pontiac, Mich.: 1-ton parcel delivery wagon, 1-ton express truck, 1-ton delivery truck, 3,000-pound stake truck, 3,000-pound chassis, 3,000-pound express truck, 3-ton chassis, 5-ton chassis, opera 'bus, 12-passenger Pullman, 20-passenger brake.

Knox Automobile Co., Springfield, Mass.: 2,500-pound express truck, 3-ton chassis, 3-ton gasoline fire engine and hose truck, 3-ton combination chemical engine and hose truck.

Oscar Lear Automobile Co., Springfield, Ohio: 1,500-pound delivery car, 3-ton stake truck, 32-passenger 'bus, four-cylinder 24-horsepower motor.

Panhard & Levassor, New York City: 2-ton express truck.

Alden Sampson Mfg. Co., Pittsfield, Mass.: 4-ton stake truck.

Studebaker Automobile Co., South Bend, Ind.: 1,500-pound panel delivery wagon, 3 1-2-ton stake truck.

Reading Standard Co., Reading, Pa.: Motor-cycle van.

ACCESSORIES, TIRES AND PARTS

The General Electric Co., Schenectady, N. Y., mounted in several of the booths complete charging boards for electric garage installations; these are made up in all sizes for any number of trucks. Arthur C. Harvey Co., Boston, Mass., displayed in actual operation large cutting tools and steels of various kinds; another concern exhibiting a similar line was Edgar T. Ward & Son. The Hisey-Wolf Machine Co., of Cincinnati, make a very complete line of portable and bench drills and grinders operated by electric motor. Gilbert & Barker, of New York, displayed a large line of both portable and storage tanks for gasoline and oil suitable for commercial garage use; several were equipped with meters which not only registered the amount drawn off each time but further gave a total register for the day.

Cans and receptacles for small quantities of gas and oil as well as waste, funnels and patent oil can spouts are made by Sexton Can Co., of Boston, and the Dover Stamping & Mfg. Co., of Cambridge.

The heavy vehicle battery field was well represented by the display of the Exide, National and American storage batteries; the National showing a bolted connection between cells in place of the usual burned strap. The nearest approach to a commercial speedometer was a special Jones instrument attached to the Rapid trucks; this registered up to thirty miles an hour.

Very few of the tire builders seemed to adequately appreciate the sales possibilities in and around Boston, and with the exception of the Firestone, Swinehart and Sectional Rubber Tire Co. there was little display in the line of solid rubber tires. The first two had their usual large and attractive displays, and the last-mentioned showed the block tire, well known under the name of "Kelly-Springfield." Though the requests on the part of users for a commercial lamp were repeatedly heard at the various truck booths, nothing specially adapted to the field could be found at any accessories stand in the show.

MOTOR TRUCK LAMPS NEEDED

Editor The Commercial Vehicle:

Sir: We read with interest the editorial in the March number relating to lamps for motor trucks. At the recent Boston show we made careful search for a strong, durable lamp which would not require constant polishing to look well, and we could not find one. We have had much trouble with our oil lamps, for the roads over which we operate our trucks are very rough and hard. A new set of lamps will stand up about two weeks, then usually a front works loose and the lamp itself will begin to rattle and sometimes fall off and be lost. If it stays on, the front will probably drop off, and the entire lamp will be so shaken that it will have to be overhauled at a cost of about two-thirds of its original price.

What we want is a lamp that is not made for show purposes; a lamp that will not have to be constantly polished. Preferably one made of stamped iron or steel, with hanger attachments that will not work loose from vibration or road shocks. It should be made of the fewest possible pieces, and with only one opening for lighting purposes, and with an oil receptacle that will fasten in solid and stay put.

We believe there is a growing demand for such a practical form of motor truck lamp; all of those commercial vehicle operators with whom we have talked have had similar experiences and would gladly buy a serviceable light. We are now considering having some specially made in Boston for our own use. The first cost of such lamps would probably be quite as much as the best brass lamps now obtainable, but if they would stand up to their work this would not be any objection. If you can help truck owners to get what they want, we believe they would be very appreciative. Abbott & Miller.

Quincy, Mass.

We believe that the foregoing letter from a firm of practical truck operators is worthy of the serious attention of the makers of pleasure car lamps, who have hitherto failed to keep pace with the development and constantly increasing use of the work vehicle. It voices an experience which we have frequently heard discussed by other motor truck and wagon users throughout the country.—The Editors.

LIFE OF A MOTOR TRUCK

The question is often asked "How long will a motor truck stay in active commission?" An exact reply is impossible because every individual truck operates under different circumstances, performs different service and may have different care. Examples of what some trucks have done, however, show that a good truck is capable of long and hard service. The Packard Motor Car Company, of Detroit, Mich., uses its own 3-ton truck exclusively in its local hauling. The Packard company's No. 4 truck was put into service in 1907. It has been actually in service 522 days during which it has covered 16,489 miles. Its principal work has been in hauling express and freight between the Packard factory and the different railway freight depots. The truck, in the time it has been in use, has made 1,373 trips and has hauled 7,833,022 pounds of freight, or, approximately, 4,000 tons. Its tonnage per day has been 15,006 pounds and its average tonnage per trip 5,705 pounds. The gasoline consumed in these 522 days of work has been 3,548 gallons, or on an average of 4.64 miles per gallon. The truck has recently been put into the shop for repainting and overhauling, and, as soon as this is accomplished, will be again placed in the regular service.

The Packard factory being about four miles from the business center of Detroit, the company employs a special delivery car for carrying the mail back and forth and for other special trips where prompt service is desirable. This car is a 1907 Packard "Thirty" experimental car, and which went onto the road March 10, 1906. As an experimental car the executives of the company and members of the engineering department drove the car 55,000 miles. In April, 1908, it was equipped with a light delivery body and has since been the special delivery car. In this service it has done active work 252 days, it has covered 17,742 miles, making 1,509 trips and an average per day of 70.4 miles. Thus, between its road service and its later work as a light delivery wagon, this car has made about 73,000 miles and will be continued in its present capacity.

An Eighteen-Story Addition to its new clubhouse is already planned by the Automobile Club of America. This will occupy ground recently purchased immediately in the rear of the eight-story clubhouse and garage on West Fifty-fourth street, New York, which was completed about two years ago.

TAXICAB OPERATORS' TRUST RUMORS ARE DENIED

DURING the past month most of the New York daily papers have printed reports of the alleged plans of a "taxicab trust" to consolidate the motor cab operating companies in New York City. Investigation by THE COMMERCIAL VEHICLE has elicited no evidences of such a movement, but on the contrary, denials of such an intention and ridicule of the possibilty of bringing such a consolidation about at the present time.

Apparently, the report started as a result of the organization of a new company incorporated in New Jersey recently under the name of the Taxicab Service Co., with $2,200,000 authorized capital stock, of which $1,000,000 is in preferred shares. This company later took over the motor cab service heretofore conducted by the W. H. Seaich Co., with American Locomotive landaulet cars, and continued the service under the name of the Taxi-Service Co. of New York, with offices in the Cambridge Building, at Fifth avenue and Thirty-third street.

Winthrop E. Scarritt, banker and ex-president of the Automobile Club of America, is one of the incorporators, the two others being Henry K. Picking and James Mapletoft.

Officers and directors of the new company are as follows:

President, Harlan W. Whipple; vice-president, M. W. Norton; secretary and treasurer, James J. O'Brien, of Boston. Directors, W. S. Stafford, of the Stafford Ink Co.; C. E. Longley, of J. B. Barnaby Co., Providence; Belvidere Brooks, general superintendent Western Union Telegraph Co., New York; A. R. Whaley, general manager Grand Central Terminal, New York; Benedict Lederer, manufacturing jeweler, Providence; Robert J. Allyn, Allyn House, Hartford; Walter D. Grand, Tichenor-Grand Co., New York; Lawrence Barnum, Lawrence Barnum & Co., bankers, New York; William H. Seaich, Wm. H. Seaich Co., New York; Edward W. Moore, capitalist and street railway operator, Cleveland; J. J. Mahoney, attorney and capitalist, Lawrence, Mass.; E. J. Garvan, P. Garvan & Son, Hartford; Winthrop E. Scarritt, banker, New York; E. W. Pitman, of E. W. Pitman & Co., contractors, Lawrence, Mass., and Charles M. Englis, Brooklyn, N. Y.

Mr. Whipple has long been identified with the operation of street railways, gas companies and other industrials and is a stockholder in the Boston Taxi-Service Co., of Boston. He is well-known in motor car circles in New York and Boston. When seen in connection with the plans of his new company and the rumors of a "taxicab trust," he said that he knew nothing of any movement to consolidate the operating companies in New York and that he could say for his own company that it has no such plans; he could not, of course, speak for others, but so far as he knew there was no movement of the kind afoot. The Taxi-Service Co. had, he said, taken over the business of the William H. Seaich Co., which was operating sixty American Locomotive cabs, and had placed its order for 200 more cabs of the same make. Deliveries of the new machine are to begin in April and are to continue at the rate of twenty-five a month thereafter until the order is completed. The Seaich garage on East Thirty-first street has been leased, and the cabs will be operated from there, with stands at the Waldorf-Astoria, Holland House, and other leading hotels.

The new cabs are to have red running gear, bright blue bodies and black tops, with extension roof and glass screen rising from the dash. They will differ from the brown cabs of the Seaich Company also in the construction of the top, which, instead of breaking on a line directly over the front seat, will break and fold back from the rear of the side doors, thus leaving the door frames intact and preventing loosening and rattling of the doors. They will be even more finely finished and more luxurious than the machines taken over from the Seaich service, which has been recognized as above the standard. Extension fronts are now being put on the present machines in service. Thus, all of the cars will have the general appearance of privately owned vehicles, which has been heightened by the fact that up to the present time they have not been equipped with taximeter instruments. Now, however, recording instruments are being fitted.

The following schedule of charges has been adopted by the Taxi-Service Co.:

RATES

First half mile or fraction	$0.50
Each quarter mile thereafter	.10
Each four minutes' waiting	.10

EXTRA CHARGES

For steamers and trains (outside of Manhattan) the charge for return (besides charge indicated on meter) is	1.00
When dismissed north of One Hundred and Fifty-fifth street, charge for each mile or fraction (minimum charge, $1) to Waldorf-Astoria (or stand started from).	.20
To insure (or guarantee) service for return from opera, theater or party, etc., an additional charge will be made of	1.00
Each package or small trunk carried outside	.20

All ferriage and bridge tolls to be paid by passenger.

If taximeter is out of order fare will be charged at regular legal rates.

From one to four passengers carried at the above rates day or night.

If the car is disabled the service up to the disablement must be paid for.

A car ordered and not used must be paid for up to the time the driver is dismissed, including the charge for sending.

A car responding to an order is charged for from the time it leaves the nearest stand or station.

Coupon books are sold at a discount of 5 per cent., giving $10 worth of rides for $9.50, or $20 worth of rides for $19.

Private service is also provided by the day, week or month, and to patrons hiring cars for three months or longer chauffeurs dressed in special livery selected by patrons will be furnished.

The fact that the new company has announced rates of 50 cents for the first half mile, as against 30 cents for the first half mile charged by the New York Taxicab Co. and the New York Transportation Co., has led to reports of an increase in taxicab rates to be put in force coincident with the rumored consolidation of the operating companies. On this point Mr. Whipple said that instead of being an increase, the new tariff adopted by his company is in reality a reduction from the rates formerly charged by the Seaich Co., which were considerably higher than the prevailing tariff because of the *de luxe* service provided. He further stated that his company was not in any combination or merger and was free to make any rates it chose, as was also every other taxicab owner in the city, so far as he knew.

"Reference has been made," he continued, "in recently published newspaper stories, to the fact that the Boston Taxi-Service Co. is charging 30 cents for the first half mile as against 50 cents for the first half mile in New York. Conditions of travel and stands in New York are different; and there is much larger dead mileage here than in Boston. This dead mileage costs the company just as much as paying mileage, and it might be recalled that the Boston company charges 20 cents per mile for return mileage after the first two miles, which partially covers the cost of cabs when returning empty. No such charge is made by the New York Taxi-Service Co.

"We bought out Mr. Seaich, who used the same cabs as we do in Boston. We found he was operating on substantially the same rates per mile as the old livery business was operating. After looking the field over, we decided we could and would reduce these rates to the rates that have been used at the Hotel Knickerbocker and St. Regis Hotel—to wit, 50 cents for the first half mile and 40 cents per mile thereafter.

"We are studying the problem of eliminating the dead mileage as much as possible by distribution of stands, and if we later on find we can operate at a lower rate, we will certainly adopt it, for our experience in other public service corporations, such as gas companies and electric light companies, proves that the lowest rate at which business can be done is the most profitable and satisfactory in the long run.

"As a matter of fact, the only difference between the rates of the Taxi-Service Co. of New York and the Boston company, to which reference has been made, is the matter of 20 cents for the first half mile. Thereafter the mileage rates are identical."

LOCAL SERVICE IN BROOKLYN

As a result of the success attending the operation of a number of Darracq cabs stationed in front of his livery establishment in Brooklyn by the New York Taxicab Co., William W. Rudd recently organized a local concern, which has been incorporated as the Brooklyn Taxicab Co., with authorized capital stock of $250,000. The new concern has been operating for two months, and is constantly adding to its equipment of four-cylinder landaulet cabs. The company is financed by prominent business men and capitalists of the borough. Mr. Rudd is president; Franklin Kelly, vice-president; William A. Abel, treasurer, and Vincent W. Many, secretary.

To facilitate the service, Brooklyn has been divided into seven sections, and arrangements have been made with the leading hotels, restaurants and theaters for the exclusive privilege of supplying cab service. Mr. Rudd, who has been in the livery business in Brooklyn all his life, has built up a large establishment at Putnam avenue and Ormond place, and the stables there are being utilized as a main garage from which patrons within a radius of a mile are supplied. Sub-stations have been located at the Crescent Club, Abraham & Straus' department store, Loeser's and Raub's café, and in the Park Slope section, Prospect Park South, East New York, East Williamsburg, Williamsburg, and at three places in Coney Island, and three places at Sheepshead Bay. All the outlying stands are connected with the central station by telephone.

Plans have been formulated for the making of arrangements with one of the large operating companies in Manhattan whereby Brooklyn patrons will have the advantage of trips across the East River at the regular fare instead of having to pay for the return trip of the cab, as at present.

Mr. Rudd estimates that by May 1 he will have 125 cabs in operation, and says that these will be increased as the demand warrants.

CARTERCAR FRICTION DRIVE CABS

Shipments of Cartercar friction-drive taxicabs are now being made by the Cartercar Co., of Pontiac, Mich., as the accompanying illustration shows. Like many other American motor car builders, the Cartercar Co. has been forced to build these cabs for public service by the demands of its agents and customers in many parts of the country. Agents and others have been using the regular Cartercar touring model for livery purposes, and, because they were so easy to handle on account of the friction drive and the number of speeds obtainable, urgently called for the same type of chassis fitted with a landaulet body for taxicab service. The result is here seen in the first shipment of the new cabs from the Pontiac factory, consigned to the already well-developed taxicab center in New York City.

A conspicuous example of the use of the Cartercar touring machine for livery purposes is found in San José, Cal., where one is used in conveying tourists up Mount Hamilton to Lick Observatory. Another is seen in Sandusky, Ohio, where the owner of a Cartercar five-passenger tourist put it in the sightseeing business and carried more than 4,000 passengers in 3 1-2 months.

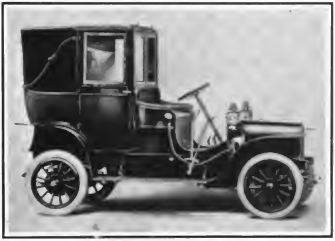
SHIPMENT OF CARTERCAR TAXICABS FROM PONTIAC

The new taxicab has the same chassis as the Model K touring car, and is fitted with the new aluminum chain housing, in which the driving chains run in an oil bath and are protected from mud and dust. The engine is forward, and drives through a friction disk and a friction wheel splined on a countershaft, which carries a differential and sprockets for the side chains.

FRANKLIN CABS FOR PITTSBURG

Twenty new Franklin air-cooled motor cabs of the landaulet type are to go into public service in Pittsburg this month, the Pittsburg Taxicab Co. having placed its order for them some time ago. The new company has temporary offices in the People's Bank Building, but has a new garage in process of construction at the corner of Centre and Negley avenues. John W. Weibley is general manager.

One of the new cabs comprising this order is shown in the accompanying engraving. It is known as Model K-1, and is driven by the Franklin four-cylinder air-cooled engine of 18 horsepower. This type of power plant has special advantages in taxicab service in winter, as the cabs must be allowed to stand a large part of the time in the open street in cold weather with the engine stopped.



IMPROVED TYPE OF FRANKLIN CAB

The chassis frame is of laminated wood, which absorbs and deadens the shocks due to bad paving, and the body is made to ride most comfortably by the use of full elliptic springs. Exterior finish is in Quaker green, with black molding and black lower body panels. The interior is finished in dustproof light cloth and leather, and the front seat is upholstered in green leather.

The H. H. Franklin Mfg. Co. has supplied taxicabs to New York, Reading and Pittsburg, but is not ready to announce any plans regarding further production of taxicabs beyond stating that the conditions promise a growth in this line of the motor car business, which is comparatively new for the company.

MAXWELL CABS IN ATLANTA

Eight Maxwell taxicabs were put in public service in Atlanta, Ga., in February by the Altanta Taxicab Co., recently organized with F. J. Cooledge, president; L. P. Stevens, vice-president; R. J. Ingraham, treasurer, and V. A. Batchelor, M. O. Jackson, A. L. Dunn, Paul McMichael and Drs. L. C. Fischer and Tom Hinman, directors.

The first lot of machines represents only the beginning and the number is to be increased as rapidly as shipments of the cabs can be obtained from the manufacturers. The rates charged are 30 cents for the first half mile, and 10 cents for each additional quarter mile. An extra charge is made of twenty cents a mile or fraction from the stand to the place where the cab is ordered, and a similar charge for return of the cab empty when dismissed beyond a limit of one mile from the station.

That there is to be some competition in Atlanta is indicated by the incorporation in March of the National Taxicab Co., with $15,000 capital stock, which announced its intention of putting in another taxicab service. The incorporators are: H. L. Hopkins, president of the Atlanta Motor Co. and Southern manager of the Atlanta Refining Co., and J. H. Johnson, Southern manager of the Greigy Analine Co.

They propose to establish also a messenger and parcels delivery service.

TIPS ARE TABOOED

Chauffeurs engaged to drive the taxicabs that were put in operation in Macon, Ga., last month by the newly organized Taxicab Auto Co., are under agreement not to accept tips from patrons, and the public is requested by the company not to offer them. This is a new wrinkle that will commend itself to the public wherever it may be introduced. The drivers are paid a salary that is expected to be sufficient.

The promotor of the enterprise is H. K. Burns, manager of the Maxwell Automobile Co., of Macon, and the machines used are Maxwell two-cylinder landaulet cabs. Associated with Mr. Burns is O. W. Lewis, formerly master mechanic of the Texas Midland Railroad, and Dr. A. B. Hinkle, of Macon. The garage is located at 460 Fourth street, in a building formerly occupied by the Hagan Gas Engine Co.

The tariff adopted is unusual and is lower than prevails generally. It is as follows:

TAXICAB RATES

For one-half mile or fraction	$0.25
For one mile or fraction	.35
For one and one-half miles or fraction	.50
For two miles or fraction	.65
For each additional mile	.30
Hire per hour (first hour)	3.50
Each additional hour	3.00
Standing time per hour	1.50
Engagements to operas and dances	5.00

Night service double charge after 9 o'clock.

CANADA SWINGS INTO LINE

Toronto is being invaded by the taximeter cab, and the police commissioners of the city have been asked to amend the police regulations so as to permit of their operation. The new vehicles are being introduced by the Berna Motor & Taxicab Co., Ltd., which has adopted a tariff that is about midway between the rates generally fixed by the American companies and those charged in London. The rate is 20 cents for the first half mile and 10 cents for each additional half mile, for from one to four passengers. No charge is made for the trip from the station to the place where the cab is called nor for the return trip empty after the cab has been dismissed. The charge for waiting will be 10 cents for each four minutes, and 20 cents is to be charged for carrying a trunk, but hand bags will be carried outside free. The drivers are to be put in uniform.

London, New York and Montreal capital is said to be interested in the undertaking, and it is not likely that any of the stock will be offered to the public. The company is incorporated with authorized capital stock of $500,000. A large number of taxicabs has been ordered for early delivery, and the first lot of ten was to be put in service before April 1.

MINOR TAXICAB NEWS

Taxicabs are to be operated in Indianapolis soon by Charles W. Sheets & Son, who are erecting a concrete garage at 1015 North Capitol avenue. As many machines will be put in service, it is said, as the patronage demands.

The New Haven Taxicab Co. is the style of a concern that is operating a service in New Haven, Conn. It has been incorporated with authorized capital stock of $25,000, the incorporators being George G. Nesbit, who started a service with two machines last December, and Peter S. Nesbit and Robert G. Nesbit.

Stevens-Duryea limousines, to which taximeter instruments have been attached, are being employed in the first public service of the kind started in Oakland, Cal., across the bay from San Francisco. The machines are operated by F. A. Stewart, who conducts the largest and most up-to-date automobile livery business in the city. The rates charged are 40 cents a mile for two passengers, and 60 cents a mile for three or four, with a minimum charge of 50 cents.

Hartford, Conn., has now fallen in line, and a cab service has been started there by R. D. and C. O. Britton, who are using Maxwell four-cylinder chassis, fitted with landaulet bodies.

Taxicabs have made their appearance in Dallas, Tex., where a local liveryman has put four on the streets.

Experimental service with eight taxicabs of four different makes is being conducted at the Broad Street station of the Pennsylvania Railroad in Philadelphia. Two each of the following makes of machines are represented: American Locomotive, Thomas, Sultan (built by the Sultan Motor Co., of New York) and the Devon (built by the Merchant & Evens Co., Philadelphia). They are all being operated under the control of their owners in trial service, and no conclusions have yet been reached as to the results of the experiment, according to Ivy S. Lee, of the Pennsylvania Railroad Co.

The St. Louis Taxicab Co. has started an up-to-date service in St. Louis, maintaining a garage at 5011 Delmar avenue and a cab stand at McTague's restaurant.

Ten Atlas two-cycle taxicabs have been bought by Charles A. Coey, of Chicago, to be added to his equipment of public service machines in the Windy City.

Five motor cabs built by the Ford Motor Co., of Detroit, are in use in Denver by the Denver Taxicab Co., with headquarters at 1437 Cleveland place. They are equipped with Jones taximeters. Although the business is new to Denver, the service seems to be growing in popularity. The Denver Taxicab Co. was incorporated last December under the laws of Colorado with $20,000 authorized capital stock. F. A. Austin is president, F. W. Reynolds, vice president, and B. J. Reynolds, secretary-treasurer.

Of 154,391 motor vehicles registered in Great Britain and Ireland on September 30, 1908, 12,104 were used for trade purposes, 5,880 were motor omnibuses and taxicabs.

MILITARY USE OF MOTOR CABS

Arrangements have been made between the General Motor Cab Co. of London and the County of London Territorial Association whereby in event of war the company will furnish 2,000 taxicabs and their drivers for the purpose of carrying troops, ammunition, stores and wounded. Each car will carry four men with arms and a certain quantity of ammunition. The main purpose, however, will be to rush to the firing line small ammunition and tinned rations and to carry back the wounded. The drivers will be under no military discipline and there will be no enrollment, the men volunteering freely for the service and being given a badge and stripes on the coat sleeve to indicate that they are members of the Territorial Reserve Transport.

Although the plan is at present arranged only for London, it will be carried out on similar lines by the Provincial Motor Cab Co. in Scotland, the north of England, the midlands and on the south coast. Upon the outbreak of war, a telegram will be sent to the company's headquarters and each driver will be dispatched with his cab to one of the London public squares appointed for mobilization. Thus reinforcements can be rushed to meet invasion and the injured quickly removed from the scene of conflict.

NEW YORK TRUCKS TO PARADE

Special attention of the Carnival Committee is being given to the section for commercial vehicles that is to take part in the great motor car parade, to be held April 10, in connection with the second annual New York Automobile Carnival Week. This feature was discussed at length at a meeting of the Committee held last month, at which plans were laid to canvass the large retail establishments and other local concerns that use motor wagons, with a view to making this section an impressive object lesson to the public and to demonstrate the importance of the self-propelled commercial vehicle in modern commercial and industrial life.

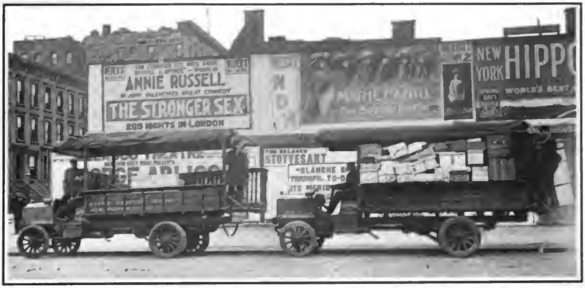
A special committee was appointed with Col. N. C. Pardee as chairman, and C. P. Skinner and Alexander Howell as the other members, to confer with the big houses and solicit their co-operation to make this division interesting and educational in character. No restrictions will be placed on the use of decorations and advertising devices. A liberal prize will be awarded the firm making the most elaborate showing in this division.

The various taxicab companies will also be allowed to join in this division with decorated motor vehicles.

Austria-Hungary has a population of about 48,000,000. It also has a large standing State debt. Yet its government has appropriated during the last five years about 10,000,000 Kronen, and in the last year about 2,000,000 Kronen to be used entirely in the use and development of the motor vehicle in its various departments writes James L. Carples in the New York *Herald*. The post office gathers up and delivers its mail by motor cars and the army uses motor trucks exclusively for baggage and transport wagons. In its hospital corps, telegraph service, fire department, and in every branch of the service where speed and economy are necessary, advantage has been taken of the motor vehicle as a modern medium of transportation. Government vehicles are of home build.

MOTOR TRUCKS IN METROPOLITAN EXPRESS SERVICE

ONE of the clearest indications of a successful future for the commercial motor vehicle is the rapid adoption of such vehicles by express companies. The business of these companies is transportation. They have studied it in all phases for many years. They know its ins and outs better than does the ordinary business house of whose work traffic is only one item. The Adams Express Company in New York has taken eight of the first Packard 3-ton trucks to be delivered by the Packard Motor Car Co., of New York. Including the 6 1-2-ton Packard Trucks which were made for the Adams Express Company several years ago, the latter company will now have in regular service in New York fourteen Packard trucks.



TYPE OF PACKARD 3-TON TRUCK IN ADAMS EXPRESS SERVICE IN NEW YORK

The Adams Express Company was one of the first advocates of motor wagons. Its experience in motor traffic started with steam wagons, which were discarded in favor of electrics. A number of the latter are now used extensively in several cities. This pioneer work in the development of motor service, it is asserted, has been due to a firm belief in the eventual supersedure of horses for business hauling. It is pointed out that the volume of business in New York and other large cities is increasing so rapidly that the old horse delivery system will soon be rendered absolutely inadequate. Not only has the routine delivery and collection work on established routes become steadily greater, but much more territory has to be covered than formerly and this territory will continue to increase. Consequently, motor trucks hauling heavy loads over comparatively long distances will greatly increase efficiency and effect economy.

The Adams Express Company's recent installation of Packard 3-ton trucks is obviously the beginning of an extensive installation of gasoline wagons in New York and also in other cities. The company's practice speaks particularly well of the Packard trucks, because, of the eighteen gasoline trucks altogether installed, fourteen of these are Packards, either being the ones just put into service or the old smaller trucks which have been used regularly for several years and which are doing such good work that they will be continued.

Knowing that the proper care and handling of motor vehicles is a most important consideration in obtaining efficient and economical service, the Adams Express Company has gone about the maintenance of its gasoline trucks in a thorough and practical manner. At 242 West Forty-seventh Street there is a special gasoline vehicle garage, of concrete construction. In this garage there is not only storage room but a complete repair shop and staff of mechanics, under the charge of a superintendent of garages, who directs the care of the trucks and plans their general system of usage. The trucks are carefully looked over by experts when they are in the garage, so that they are not likely to be sent into service in any other than first-class condition.

Most of the drivers were broken into the work by the Adams company and constitute a more carefully trained corps of drivers than is ordinarily encountered in similar work. At the present time two floors of the gasoline garage building are used as a stable for horses and as storage room for wagons, but the building is in such condition that this room is quickly available for an increase in the motor equipment. The Packard 3-ton trucks are used mainly in the extensive work of transferring heavy loads from one express depot to another and in other similar hauling on comparatively long runs.

An excellent example of the utility of the Packard truck in the Adams service is furnished by the trucks that are exclusively used as night wagons.

The Packard truck, in handling outgoing freight, especially between Harlem and the West, makes a saving of 24 hours west of Pittsburg, and, in most instances, a saving of 12 hours on outgoing freight east of Pittsburg. This extreme saving in the total time of through express delivery is accomplished by enabling the Adams company to get its late collections of uptown express to Jersey City in time to reload it onto the special express train leaving at 9:40 at night.

A night truck plies between the Jersey City dock of the Adams Express Company and its distributing station on One Hundred and Twenty-fourth Street, Harlem. It carries express from the garage on West Forty-seventh Street to Harlem and there loads up with a full load of outgoing freight, which is taken down to the ferry and over to the Jersey City docks. It is then immediately reloaded with incoming express and goes to One Hundred and Twenty-fourth Street, via the Forty-seventh Street Station. During the night a truck also makes a trip to Brooklyn with incoming freight one way and outgoing freight the other way, also carrying other freight which merely needs transferring between Brooklyn, Forty-seventh Street and Harlem.

The Adams company is also using a Packard 3-ton truck in special work between Jersey City and Weehawken, making the trip direct, with a full load, in half an hour. This was formerly made by horse trucks which crossed from Jersey City to New York via the Twenty-third Street Ferry and thence back to Weehawken by the Forty-second Street Ferry. This roundabout route, which took two hours, was necessary because the hills between Weehawken and Jersey City were impossible for the horse trucks. The new service by means of a Packard truck saves an hour and a half and avoids crossing two ferries, the hills being easily negotiated by the truck.

The regular trip from Harlem to Jersey City, a distance of 5 1-2 miles, exclusive of the ferry, is made by the truck in one hour, fifteen minutes, including the time consumed in the ferry crossing. Previously, the Adams company was unable to make this trip in less than two hours, fifteen minutes with horses, and could rarely catch the 9:40 night train at Jersey City, even by galloping the horses wherever the traffic permitted.

This cutting down of the time of delivery in all cases where the truck has replaced horses has proved to be a great saving to the Adams Express Company. Also, it has obviated the constant fear which exists in the use of horses, that valuable animals will be seriously injured by being necessarily worked under pressure on slippery pavements and in hot weather.

Except under the press of unusual work, the night truck is not run during day time, as the Adams company, very wisely, has allotted part of the time each day for every one of its trucks to be in the garage.

ELECTRIC VEHICLE ASSOCIATION FORMED

National Organization of Vehicle and Battery Makers and Central Station Men Perfected in Boston with Object to Promote Use of Electric Vehicles

AT a meeting of nearly fifty representatives of leading electric vehicle and battery manufacturers, electric light and power companies and tire makers held in Boston at the Hotel Tuileries on March 11, an organization was formed under the name of the Electric Vehicle and Central Station Association. The objects are to promote the use of the electric pleasure and commercial vehicle, and any person or member or employee of a company engaged in the manufacture of electric vehicles, their equipment or distribution, in the sale of electric power, or in furthering the publicity of the same, or any owner of an electric motor car is eligible for membership in the association.

Officers were elected as follows: President, Frank J. Stone, of the Electric Storage Battery Co., 60 State Street, Boston; treasurer, L. R. Wallis, of the Edison Electric Illuminating Co., 39 Boylston Street, Boston; secretary, H. T. Sands, of the Malden Electric Co., 139 Pleasant street, Malden, Mass. Executive board: E. W. M. Bailey, S. G. Thompson, A. C. Gray, A. F. Neale, Day Baker, N. T. Wilcox, D. E. Manson or substitute, J. H. Neal, and C. B. Davis or substitute.

A banquet preceded the business meeting and election of officers. The central station men showed a great deal of interest, and have taken hold with the manufacturers in the movement with enthusiasm. It is proposed that the association shall be national in scope and have its headquarters in Boston, where an office has been located at 12 Pearl Street.

As an outgrowth of the sentiment developed at the meeting, plans are being worked out for the establishment of many garages and charging stations at advantageous points for the accommodation of the owners of electric machines—commercial, pleasure and professional —so that hereafter the user can find recharging facilities without exceeding the mileage limits of his battery. The plans also contemplate a systematic inspection of batteries, either at the public garage or in the private garage of the owner, and, in some cases where it is found necessary, battery relay stations may be provided.

A campaign of publicity is to be started and pushed, the first notable evidence in this direction being the issuance of a new periodical called *The Electric Vehicle and Central Station,* and published monthly, the first number of which appeared in March. For the benefit of houses using electric trucks and delivery wagons, illustrated talks and lectures on the care and operation of vehicles and batteries are to be arranged, and instruction will be offered to electric vehicle garage men in matters pertaining to the entire equipment.

Electric vehicle, battery, motor and tire manufacturing companies were represented at the meeting as follows:

Studebaker Bros. Co., William P. Kennedy, A. M. Welch and S. G. Thompson; General Vehicle Co., J. Allen Smith, Day Baker and C. C. Bradford; Couple-Gear Freight Wheel Co., H. B. Church; Baker Motor Vehicle Co., A. F. Neale; Babcock Electric Carriage Co., Ira Miller; Electric Storage Battery Co., Frank J. Stone, T. P. Bedford and F. B. Neely; Edison Storage Battery Co., W. C. Bee; General Electric Co., C. B. Davis and J. A. Wilson; Westinghouse Electric & Mfg. Co., D. E. Manson and J. W. Lewis; Firestone Tire & Rubber Co., T. J. Glenn, W. P. Berrien and W. R. Walton.

A dozen of the electric light and power companies in and around Boston were also represented, as was also the Park Square Auto Station, the Bates Advertising Co., the *Electric Vehicle and Central Station,* and S. R. Bailey & Co.

Following are the names of the members already enrolled in the new organization, together with the companies they represent:

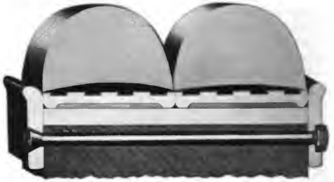
W. H. Atkins, general superintendent Edison Electric Illuminating Co., Boston; Day Baker, New England manager General Vehicle Co., Boston; E. W. M. Bailey, S. R. Bailey & Co., Amesbury; J. H. Neal, *The Electric Vehicle and Central Station,* Boston; C. H. Hile, *The Electric Vehicle and Central Station,* Boston; C. C. Bradford, General Vehicle Co., New York City; F. E. Bradbury, Somerville, Mass.; H. B. Church, Couple Gear Freight Wheel Co., Grand Rapids, Mich.; Ira Miller, Babcock Electric Carriage Co. and Couple Gear Freight Wheel Co., Westfield, Mass.; S. Fred Smith, Salem Electric Light Co., Salem, Mass.; L. D. Gibbs, Edison Electric Illuminating Co., Boston; C. J. R. Humphreys, Lawrence Gas Co., Lawrence, Mass.; N. T. Wilcox, Lowell Electric Light Corporation, Lowell, Mass.; Warren D. King, City Electric Light Plant, Peabody, Mass.; Converse D. Marsh, Bates Advertising Co., New York City; F. L. Ball; D. E. Manson, Westinghouse Electric & Mfg. Co., Boston; A. C. Gray, Edison Electric Illuminating Co., Boston; L. R. Wallis, Edison Electric Illuminating Co., Boston; A. F. Neale, Baker Motor Vehicle Co., Boston; S. G. Thompson, Studebaker Bros. Co. of New York, Boston branch; William P. Kennedy, Studebaker Bros. Co. of New York, New York City; Frank J. Stone, Electric Storage Battery Co., Boston; Thomas P. Bedford, Electric Storage Battery Co., Boston; Alexander Churchward, General Electric Co., Schenectady, N. Y.; George D. Luther, Electric Storage Battery Co., Boston; W. G. Bee, Edison Storage Battery Co., Orange, N. J.; W. H. Francis, Edison Electric Illuminating Co., Boston; Thomas Glenn, Firestone Tire & Rubber Co., Boston.

MAGNITUDE OF THE STEEL TRADE in the United States is shown by statistics recently published in which it was stated that the aggregate value of the products of the blast furnaces, steel works and rolling mills, forges and bloomeries was a little more than $900,000,000 in 1905. Nearly 250,000 men were employed and $140,000,000 paid out in wages. In 1880 the country produced 3,835,191 tons of pig iron, less than one-sixth of the quantity produced in 1907, and 1,027,381 tons of steel ingots and steel castings while the output in 1905 was 13,670,592 tons. In 1880 the average price of steel bars and rods was $64.86 a ton, which had been reduced to $34.41 a ton by 1905.

IF IT HAD NOTHING ELSE to recommend it but its time-saving and health-giving attributes, the automobile would be a permanent institution, writes E. P. Chalfant, general manager of the Association of Licensed Automobile Manufacturers, but it is as a vehicle of commerce that it is to figure more prominently in the future. The world wants labor-saving devices; the motor vehicle is one. Manufacturing plants find hauling their product with motor cars economical from every standpoint. The motor vehicle is becoming a part of every well-regulated municipality, in the health and fire branches of the public service. We often see cases of self-propelled vehicles coming back from fires, meeting the horse-drawn vehicles of the fire department going out. The Federal Government is converted to the utility of motor vehicles in its mail and other services.

NEW GIBNEY WIRELESS TIRE

The new Gibney wireless tire for commercial motor vehicles, now being marketed by James L. Gibney & Bro., of Philadelphia, was first introduced in Europe about five years ago, and its subsequent history has been one of such efficient service and increasing popularity that it is now a standard European construction. Its introduction here is due to James L. Gibney's recent visit to the Continent, where he found it in very general use. In this connection Mr. Gibney says: "Three years ago, when I went abroad, this wireless tire was just beginning to be used. At that time, however, the dual side-wire type had just been introduced and was having the run of popular favor. But this year, when I repeated my visit, I was impressed with the strides this wireless tire had made. There seemed to be nothing else on the exhibition trucks at the Paris show. I also noted that in Paris and in London all the large 'bus companies had adopted it exclusively as a tire equipment. Inquiries proved to me that it had almost supplanted the side-wire type. I resolved at once to introduce it here." The tire takes the name "Wireless" from the fact that no wires whatever are used in its construction, or in applying the tire to the wheel. The construction also differs from that of the side wire and other types, in that no channel is used, the tire being applied directly to the wheel, with only a steel band intervening. The tires, as shown in the accompanying engraving, are molded with a metal base, which is securely interlocked with the rubber in the tire. The fact that there is a thin cushion of hard rubber on the under side of the metal base insures an absolutely tight fit and a secure hold on the band. The tires may be applied either single, double or triple, as the weight of the vehicle may demand. The application of the tire is much quicker and more simple than that of the side-wire tire. The new tire is now ready for delivery, and blue prints, price lists and descriptive literature have been prepared. The guarantee which will be given with this tire will be a very agreeable surprise, say Messrs. Gibney & Bro., to American truck owners and manufacturers.


SECTION OF GIBNEY WIRELESS TRUCK TIRE

THE KANSAS CITY *Journal* has been experimenting with a 7,000-pound Studebaker electric truck in the hauling of rolls of news print paper from the railroad depots to the publication office. The electric machine is able to make eight trips loaded each day, carrying eight rolls of paper on each trip. The horse trucks could make only four trips, carrying six rolls each trip.

HAULAGE COSTS BY HORSE AND MOTOR

Data Showing the Relative Cost of Horse and Motor Truck Haulage Based on Actual Experiences in New York City—Operative Costs of Two, Three and Five-Ton Gasoline Trucks

EDWARD R. HEWITT

THE following tables are designed to show the relative cost of horse and motor truck haulage. A careful inspection of them will readily show the conditions under which trucks do the work more cheaply than horses.

In the horse tables no account has been taken of the fact that when the distance is such that an even number of trips cannot be made in a day, there is a great loss, and the results in the tables cannot be obtained. There is no such limitation on the truck.

The tables are figured with the loads going one way only, as most business is done in this way. If the horses are loaded both ways, they give out much sooner and the cost is greater. The truck can be loaded both ways, and cut the table costs in half. No account has been made of the use of a trailer, which can greatly reduce the truck-costs per ton mile, where conditions are suitable for it.

Table "A" gives the costs per load and per ton at various distances. The costs per day and distances and speeds for the horse columns have been obtained from those using horses in large numbers in New York. The figures in the truck columns have been obtained from the use of Hewitt trucks by customers, and from our own experience with cars. They are facts, not mere estimates.

The basis for the figures on the various trucks is given in the table of costs for them. A very important factor which is generally neglected, is the time allowance for delays in loading and unloading. Table "B" shows the time that must not be exceeded if the vehicles are to obtain the mileage given in the cost sheets.

It must be remembered that trucks, to give the best results, must be carefully operated. If an owner has only one or two, he must employ good drivers who can take care of them properly, and he must give them enough time to care for the machinery. Much better results can be obtained when enough trucks are operated in one unit to have a competent man in charge of them, and enough spare trucks to maintain a regular service. If locomotives require overlooking and oiling and cleaning in a round-house after each trip, how much more ought a truck which has to be operated on an uneven and dusty road!

COMPARATIVE HORSE AND MOTOR TRUCK COSTS (TABLE "A")

Load	1-Horse Wagon 1 Ton		2-Horse Wagon 4 Tons		3-Horse Wagon 6 Tons		2-Ton Truck 2 Tons		3-Ton Truck 3 Tons		5-Ton Truck 5 Tons		10-Ton Truck 10 Tons	
Average Miles per Hour	4		3		2½		12		10		8		6	
Cost per Day	$4.00		$6.00		$8.00		$9.60		$10.38		$12.67		$15.63	
Miles from Base	Per Load	Per Ton	Per Load	Per Ton	Per Load	Per Ton	Per Load	Per Ton	Per Load	Per Ton	Per Load	Per Ton	Per Load	Per Ton
1	$0.39	$0.39	$0.60	$0.15	$0.88	$0.146	$0.38	$0.19	$0.48	$0.16	$0.61	$0.125	$1.02	$0.108
2	.78	.78	1.20	.30	1.76	.29	.76	.38	.96	.32	1.22	.25	2.04	.216
3	1.17	1.17	1.80	.45	2.64	.43	1.14	.57	1.44	.48	1.83	.37	3.06	.324
4	1.56	1.56	2.40	.60	3.52	.58	1.52	.76	1.92	.64	2.44	.50	4.08	.432
5	1.95	1.95	3.00	.75	4.40	.74	1.90	.95	2.40	.80	3.05	.62	5.10	.540
6	2.34	2.34	3.60	.90	5.28	.87	2.28	1.14	2.88	.96	3.66	.75	6.12	.648
7	2.73	2.73	4.20	1.05	6.16	1.02	2.66	1.33	3.36	1.12	4.27	.87	7.14	.756
8	3.12	3.12	4.80	1.20	7.04	1.16	3.04	1.57	3.84	1.28	4.88	1.00	8.16	.864
9	3.51	3.51	5.40	1.35	7.92	1.31	3.42	1.71	4.32	1.44	5.49	1.15	9.18	.972
10	3.90	3.90	6.00	1.50			3.80	1.90	4.80	1.60	6.10	1.25	10.20	1.08
11	4.29	4.29					4.18	2.09	5.28	1.76	6.71	1.31	11.22	1.18
12							4.56	2.28	5.76	1.92	7.32	1.50	12.24	1.29
13							4.94	2.47	6.24	2.08	7.93	1.62	13.26	1.40
14							5.32	2.66	6.72	2.24	8.54	1.75	14.28	1.51
15							5.70	2.85	7.20	2.40	9.15	1.87	15.30	1.62
16							6.08	3.04	7.68	2.56	9.76	2.00		
17							6.46	3.23	8.16	2.72	10.37	2.15		
18							6.84	3.42	8.64	2.88	10.98	2.25		
19							7.22	3.61	9.12	3.04	11.59	2.37		
20							7.60	3.80	9.60	3.20	12.20	2.50		
21							7.98	3.99	10.08	3.36				
22							8.36	4.18	10.56	3.52				
23							8.74	4.37						
24							9.12	4.56						
25							9.50	4.75						

Limit of profitable horse haulage per day

LOADING AND UNLOADING TIME ALLOWED PER TRIP (TABLE "B")

Under Conditions of Haulage Table—10-Hour Day

Miles per Hour	1-Horse Wagon 4	2-Horse Wagon 3	3-Horse Wagon 2½	2-Ton Truck 50 Miles a Day 12	3-Ton Truck 45 Miles a Day 10	5-Ton Truck 40 Miles a Day 8	10-Ton Truck 30 Miles a Day 6
Miles from Base	Time, Minutes	Time, Minutes	Time, Minutes	Time, Minutes	Time, Minutes	Time Minutes,	Time, Minutes
1	20	20	18.6	14	14.4	15	20
2	40	40	37	28	28	30	40
3	60	60	55	42	43	45	60
4	80	80	74	56	57	60	80
5	100	100	93	70	72	75	100
6	120	120	111	84	86	90	120
7	140	140	130	98	100	105	140
8	160	160	148	112	115	120	160
9	180	180	167	126	129	135	180
10	200	200		140	144	150	200
11	220			154	158	165	220
12	240			168	172	180	240
13	Limit of profitable horse haulage per day			182	187	195	260
14				196	201	210	280
15				210	216	225	300
16				224	230	240	
17				238	244	255	
18				252	259	270	
19				266	273	285	
20				280	288	300	
21				294	302		
22				308	316		
23				322	330		
24				336			
25				350			

COST OF OPERATING HEWITT TWO-TON TRUCK

Price of Truck complete	$3,000
Working days	300
Average miles per day	50
Load in pounds	4,000

Depreciation 20 per cent. on $2,500. There is $500 worth of material on the truck which is constantly being renewed by the tire and repair funds.

Miles per gallon, gasoline	8
Miles per gallon, oil	100

ESTIMATE FOR FIVE YEARS' OPERATION

Items	Per Year	Per Working Day	Per Mile	Loaded Both Ways per Ton Mile	Per Cent
Depreciation	$500	$1.67	.0334	.017	17.30
Interest 5 per cent	150	.50	.0100	.005	5.19
Labor	900	3.00	.0600	.030	31.14
Tires	400	1.34	.0268	.013	13.84
Yearly Overhaul	200	.66	.0133	.006	6.92
Current Repairs	100	.33	.0065	.003	3.46
Gasoline (15 cents)	280	.90	.0180	.009	9.69
Oil (30 cents)	45	.15	.0030	.002	1.56
Insurance (All)	75	.25	.0050	.003	2.60
Garage $20 month	240	.80	.0160	.008	8.30
	$2,890	$9.60	.1920	.096	100%

COST OF OPERATING HEWITT THREE-TON TRUCK

Price of Truck complete	$3,500
Working days	300
Average miles per day	45
Load in pounds	6,000

Depreciation 20 per cent. on $2,800. There is $700 worth of material which is constantly being renewed by the tire and repair funds.

ESTIMATE FOR FIVE YEARS' OPERATION

Items	Per Year	Per Working Day	Per Mile	Loaded Both Ways per Ton Mile	Per Cent
Depreciation	$560	$1.86	.041	.014	18.0
Interest 5 per cent	175	.58	.013	.004	5.6
Labor	900	3.00	.066	.022	28.8
Tires	500	1.66	.037	.012	16.0
Yearly Overhaul	200	.66	.016	.005	6.4
Current Repairs	100	.33	.007	.003	3.2
Gasoline (15 cents)	315	1.05	.023	.008	10.0
Oil (30 cents)	55	.18	.004	.001	1.7
Insurance (All)	80	.26	.006	.002	2.6
Garage $20 month	240	.80	.018	.006	7.7
	$3,125	$10.38	.231	.077	100%

COST OF OPERATING HEWITT FIVE-TON TRUCK

Price of Chassis	$4,500
Stake Body	$200
Working days	300
Average miles per day	40
Load in pounds	10,000

Depreciation 20 per cent. on $3,700. There is $1,000 worth of material on the truck which is constantly renewed and kept up by the overhaul and repair funds. Tires, chains, sprockets, bearings, magnetos, spark plugs, coolers, etc.

Miles per gallon, gasoline	4
Miles per gallon, oil	40

ESTIMATE FOR FIVE YEARS' OPERATION

Items	Per Year	Per Working Day	Per Mile	Loaded Both Ways per Ton Mile	Per Cent
Depreciation	$740	$2.46	.0615	.0123	19.45
Interest 5 per cent	235	.78	.0195	.0039	6.18
Labor	900	3.00	.0750	.0150	23.65
Tires	700	2.33	.0583	.0117	18.40
Yearly Overhaul	200	.67	.0167	.0034	5.26
Current Repairs	150	.50	.0125	.0025	3.94
Gasoline (15 cents)	450	1.50	.0375	.0075	11.83
Oil (30 cents)	190	.30	.0075	.0015	2.36
Insurance (All)	100	.33	.0083	.0017	2.63
Garage $20 month	240	.80	.0200	.0040	6.30
	$3,805	$12.67	.3168	.0635	100%

THE VALUE of the commercial automobile has been proven beyond dispute. The amount of figures, statistics, etc., that have been printed would fill a big volume, says the Buffalo *Courier*. The actual work of a machine of this type that was engaged in demonstrating its capabilities for eight days preceding Christmas day last year, showed that there is not the slightest need for question regarding the ability of these cars. During eight days, in which the weather ran to both extremes, the car was in use ten hours daily. The stops for delivering parcels averaged 500 daily. The operating expenses amounted to six gallons of gasoline and two quarts of oil a day. Not a single stop was made for troubles. The machine did the work of four two-horse wagons and crews.

"SPEAKING OF THE VAST AMOUNT of rubber used in the motor vehicle industry," said Secretary G. H. Stadleman, of the Goodyear Rubber & Tire Co., "there is no danger of the crude rubber supply being exhausted. Notwithstanding the enormously increased demand for tires and general rubber manufacture, we do not fear, for there are 500,000 acres under successful cultivation in Central and South America and many large areas are about ready to produce."

"THE RAPID SPREAD of the commercial vehicle is going to make a great difference in the appearance of the streets in our larger cities," says H. A. Radle, of the Grabowsky Power Wagon Co. "I fully expect that in another five years the busiest streets in cities of the size of New York, Chicago, Philadelphia and Boston will be closed to horses. This will lighten traffic, as the power wagon can both start and stop quicker than the horse, it occupies less space, and is above all more clean and sanitary. Think of the immense saving on the municipal bill for street cleaning that such a change would effect."

The Commercial Vehicle

Vol. IV April 1909 No. 4

Published Monthly by The Commercial Vehicle, Incorporated, at
1402 Broadway, New York City

Cable Address
Comveh, New York

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Subscription Rates

United States, Canada and Mexico . . . . One Year $2.00
Other Countries in Postal Union . . . . One Year $3.00

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Entered as second-class matter, September 13, 1906, at the post office, New York, N. Y., under the Act of Congress of March 3, 1879.

WHERE THE INDUSTRY STANDS

With the close of the Boston automobile show last month the exhibition season came to an end, leaving the commercial vehicle still in the position of a side line at the pleasure car displays. This public estimate of the work vehicle is likely to be confirmed by the parade of machines which will take place this month in New York, as a feature of the automobile carnival, and in which the commercial vehicle will appear in its accustomed place, as the tail to the pleasure car kite. The effect of this parade will not be merely local, for the example of New York, as the great commercial center of America, is sure to be accepted as proof of existing conditions by those who are interested in vehicle construction and operation throughout the entire country. It does not need any great mental effort to recognize the fact that the commercial vehicle industry in this country is IN WRONG.

In England, France and Germany, the leading European nations in the development of the motor vehicle for practical purposes, whether in transporting passengers or freight commercially or in military or municipal service, the serious purpose of the movement is fully recognized by those who expect to profit by it, and the result is that motor commercial vehicle exhibitions and public trials are now well established features of the educational campaign.

The construction of efficient commercial motor vehicles and their successful operation has advanced sufficiently far now to make this apathetic attitude of our builders something more than a negative fault. To the wide-awake prospective purchaser it means, either that the builders have no confidence in the perfection of the present state of their art, or that they are so divided and insignificant industrially that they are incapable of expressing the courage of their convictions.

Looking below the surface, however, neither of these conclusions is correct. Broadly speaking, the builders may be divided into three classes; those who have made a success mechanically and financially, and who believe it to be their interest to continue present conditions rather than develop competition by more independent action of the industry as a whole; those who have present pleasure car interests and are quite willing to continue a "hold with the hare and run with the hounds" policy, waiting for any radical change in selling conditions to make a whole-hearted effort in the direction of the commercial vehicle; and, finally, those who have formulated no definite policy, but are content to look only at the work in their own particular shop and take no thought of the breadth and scope of the field. Outside of these classes is the small minority which appreciates the tremendous possibilities of the industry and which is always responsive to any reasonable demand for progressive action, asking only that whatever is done shall be done well.

It is from the latter that leadership must come, and when suitable action is taken, doubtless the majority will quickly realize that it must keep in step or suffer the consequences of adverse public opinion. The organization at Boston of the electric vehicle interests into an effective working body, discussed elsewhere in this issue, is a very encouraging sign of activity on the part of a section of the industry. It is now in order to hear from the moribund Commercial Motor Vehicle Manufacturers' Association.

RELIEF FROM TRAFFIC CONGESTION

Congestion of traffic in the streets of London has become markedly less since the adoption of motor omnibuses and taxicabs, according to the *London Globe*, which has investigated the subject. The motor vehicles move faster and take up less room than horse-drawn vehicles of the same type, and they transport more passengers in a given time, so that fewer of them are required for the same work. These points have often been asserted in the columns of The Commercial Vehicle and affirmed by other advocates of self-propelled street vehicles, but it is possible now to confirm them by reliable official figures contained in a report of the traffic branch of the London Board of Trade on street traffic conditions in the British capital, which furnishes the basis for the *Globe's* comment.

Figures gathered for this report show that in the five years from 1903 to 1907, inclusive, approximately 1,000 horsed omnibuses and 1,500 horsed cabs disappeared from the streets and were replaced by 1,200 motor 'buses and 700 taxicabs. As the figures were obtained from the records of driving licenses issued, they may be relied upon as authoritative. The replacement of private carriages by motor cars is not given in the report, but it is reasonable to assume that an even greater ratio of change has occurred. In New York the change is most pronounced, and, while there is no means of obtaining official statistics relating to either public or private vehicles, the great predominance of motor cars over horse vehicles on Fifth avenue during the busy hours of the day (amounting often to more than 75 per cent. of the whole) is most noticeable. And, despite the continued rapid growth of the population of the metropolis, that busy thoroughfare, through which flows all kinds of traffic save street cars, is becoming easier and safer to cross than formerly, when prancing, spirited horses scared foot passengers at the crossings. Even the most timid pedestrians have become reassured by the certainty of control of the driver of a motor vehicle, and do not display hesitancy and uncertainty in crossing the street, particularly where street traffic regulations are enforced.

It is further pointed out by the *Globe*, with regard to the conditions in London, that the motor car causes practically no dirt and that as a result of the decrease in the number of horses used there is less hauling of hay, straw and refuse through the streets. It might also be added that, instead of being a nuisance, the slight dripping of oil upon the surface of the streets has almost eliminated the dust nuisance by preventing the quick drying off of the street paving. "We have long held," concludes the comment, "that in the ideal big town there would be no horses, and London seems to be fast approaching that state of things."

Of the greatest immediate importance to the world's big cities is the reduction of traffic congestion in the streets, which has grown to be such a serious problem that millions of dollars are being expended in widening existing streets and cutting new ones through thickly built-up sections. In New York the work of widening Fifth avenue has already begun, and Chicago is soon to undertake the widening of Michigan avenue. With a view to determining the exact saving in street space by the substitution of motor vehicles for horsed vehicles, the Geo. N. Pierce Co. of Buffalo has made measurements of different kinds of outfits. From the measurements taken it was found that a single horse and cab have an overall length of 19 feet and occupy 88.7 square feet of street surface, as against an overall length of 12 feet 8 inches for a 24-horsepower town car, which occupies only 59.1 square feet. The saving is even more pronounced between the commercial vehicles, for a moving van and its horses have a length of 24 feet and occupy 112 square feet, and a brewery wagon, with its horses, has a length of 26 feet and occupies 121 square feet, as compared with an overall length of 18 feet 6 inches for a 45-horsepower gasoline truck that occupies only 84 square feet of road area. An even greater advantage is found in certain makes of taxicabs that are largely used, and which have an overall length of 11 feet and occupy but 50 square feet, and in electric trucks, whose overall length in the five-ton brewery wagon type is only 15 feet.

From the measurements made it is evident that a net saving of 33 1-3 per cent. is effected by the substitution of motor vehicles, in both lineal and square feet occupied, and as it has been common experience in practice that one motor truck or delivery wagon can do the work of two or three horsed wagons, we may safely take 1 to 2½ as the ratio of vehicles of the two types needed to do the work of a city. On this basis a complete substitution of power vehicles would result in the complete abolition of 60 per cent. of the vehicles now in use in any given city, and the 40 per cent. remaining would be motor trucks and wagons, taxicabs and omnibuses that would occupy only 66 2-3 of the space of horse vehicles, resulting in a total saving of street space of no less than 73 1-3 per cent. So it will be seen that the same amount of work could be done with only about one-quarter of the street congestion, or that four times the present volume of traffic could be accommodated before relief measures would be needed.

BUSINESS MEN'S CONSERVATISM

Slowness on the part of the modern business man to realize that he has a transportation problem of his own, especially within the great city centers, is one of the chief burdens of the commercial vehicle industry at the present time.

There are elements of absurdity in this failure of the business man to shoulder at home his logical share of the transportation problem which he is quick to discover existing by rail and water all around him to his horizons. It is this failure to accept his own share of such responsibility that at the present time is forcing the question of terminal facilities and their inadequacy home to him in the great cities.

In a speech the other day at Chicago, in which President Shonts of the Clover Leaf and Alton systems opposed even the interference of governmental commissions in the regulation of rail transportation, that opponent of government ownership admitted that—save as it might be a step toward government ownership—it might be wise to listen to the suggestion of some students of transportation advocating national ownership of city terminals. He admits that in the tangle of rail terminals in the great cities, the railroads of the country are facing the greatest obstacle to advancement of their best interests.

And yet no one contributing cause to this tangle has been greater or more far reaching than has the horse vehicle, with its unwieldy bulk and circumscribed capacities. By rail and by water for years men of technical training at high salaries have been studying and planning and evolving methods by which all the terminal facilities of a great city may be taxed, if need be, in a night and by one night's shipping. What has the business man been doing as his share in the problem?

Two great fixed movements in transportation, evolving within the last quarter century, have made a new transportation problem for the country. From a wide producing territory raw materials have been gathered for shipment to the manufacturing cities, there to be turned into finished products and in great measure returned to those sections from which the raw materials originally were gathered. Additional to this, too, is the provisioning for these manufacturing millions. How much this problem of food transportation is may be suggested in the fact that one year's consumption of butter in New York foots $30,000,000, while $24,000,000 worth of eggs are used.

But while these evolutions in trade conditions have been coming about, making new transportation methods imperative upon rail and steamship lines, complacent business with its archaic horse vehicle has been making the city terminal a Chinese wall of obstruction.

It means something when Theodore Shonts admits in a public speech that the great railway terminals in the great cities have become a bugbear to traffic large enough almost to invite government administration of them. And in no small measure the complacent man of business, holding fast by the horse vehicle of his great-grandfather, has brought the situation about. He has ignored a self-evident truth charging him with shouldering a transportation problem of his own. To solve that problem satisfactorily he must adopt methods, ways and means in keeping with systems in which he is a distinct connecting link. And to this end the horse-drawn vehicle is simply impossible.

MOTOR OMNIBUS SERVICE ON RIVERSIDE DRIVE

THE first of a lot of new De Dion motor omnibuses were put in operation in New York City in March on a route extending from Washington Square out Fifth avenue, across town to Riverside Drive, and north on that boulevard to Grant's Tomb and Claremont Inn. These machines are the first of an order for twenty-five given by the New York Transportation Co. to the De Dion factory in France. The first fifteen have been landed, five more are on the ocean, and the rest are ready for shipment. The chassis only are imported, the bodies being built in Philadelphia by the Fulton & Walker Co. With the exception of a number of minor improvements, all tending to the more satisfactory operation of the machines, the vehicles are practically the same as those which the company has been operating on Fifth avenue for more than a year and which have given great satisfaction to both the operating company and the public.

Up to the present time the service has extended only from Washington Square to Seventy-second street and Riverside Drive, but, with the additional equipment, the route has been extended north on the Drive to One Hundred and Twenty-fifth street. This gives a ride of 7 1-2 miles for 10 cents, and makes one of the most popular and attractive rides in the city, affording the only direct transportation to the city's magnificent public park extending along the bank of the Hudson River. The right to operate public stages on this route was granted by the State under a franchise acquired by the New York Coach Co., a subsidiary organization controlled by the New York Transportation Co., during the governorship of Theodore Roosevelt, the ex-President. The same franchise gives the right to run stages as far north as the Harlem River at One Hundred and Fifty-fifth street.

Although the operation of the new motor 'buses, which replaced the decrepit old horse stages formerly run on the Fifth avenue route, has proved increasingly popular with the public, which patronizes them liberally, the Park Board controling Central and Riverside Parks and the streets contiguous thereto for a distance of 350 feet from the park edge, recently passed an ordinance prohibiting the running on the parkways of vehicles of a greater height than 10 feet. Practically the only vehicles affected by this order are the motor omnibuses, which have a height of 12 feet to the top of the rail that encloses the seats on the upper deck. The order is clearly aimed at the 'buses with the object of excluding them in this way from enjoying the privileges granted by the State franchise, the reason given by the Park Commissioner for the move being that the 'buses, because of their height, injure the branches of the trees along the driveways. The matter is now being tested in the courts of the city, the driver of one of the 'buses having been arrested and the case continued, to come up later for trial.

Meanwhile, the company intends to continue running the motor 'buses as planned, said President Richard Meade, of the New York Transportation Co., when seen by a representative of THE COMMERCIAL VEHICLE. Mr. Meade pointed out the absurdity of the allegation that the 'buses injure the trees, making it evident that the upper seats could not be occupied by passengers if the branches hung low enough to be damaged by the vehicles. He also called attention to the fact that the machines used in New York are identical in general form and dimensions with the public conveyances that are used by thousands in London, Paris, Berlin and other European cities where they are recognized as standard, and that similar 'buses are operated on the famous Champs Elysees and other boulevards of Paris which are bordered by magnificent chestnut trees that are the pride of the capital.

In some of the European cities motor 'buses are operated which are fitted with an "imperial," or roof, covering the seats on the upper deck and which increases the over-all height to 15 feet. It is further asserted by the officers of the company that the new self-propelled omnibuses on Fifth avenue and Riverside Drive are no higher than the old horse-drawn stages which it operated for twenty years on Fifth avenue, and which were withdrawn and replaced by the modern form of transportation after years of criticism and ridicule directed at the antequated horse service.

These and other arguments are being incorporated in the answer which the attorneys for the company are making to the charge brought by the Park Commissioner against the company in the case now pending. As this is the first case of its kind in America directed at the operation of motor omnibuses, it will be watched with interest because of the precedent which it will establish. If a park board can enforce such a ruling, it is probable that one of the same nature can be enforced by a board of councilmen for an entire city, which would prevent the operation of motor 'buses of the double-deck type anywhere in the city where such action might be taken.

Secretary William H. Palmer, of the New York Transportation Co., speaks with enthusiasm of the service that the De Dion 'buses are rendering. They have been operated continuously through two winters without serious interruption even during heavy snowfalls; have not been the cause of serious collisions due to careless operation, failure of brakes to hold, or as a result of skidding; have developed only a few minor objectional constructional features that have been corrected in the new ones now being added to the service, and have not been the object of complaint by property owners anywhere along the routes covered, Mr. Palmer asserted. The company is especially pleased with the fact that they are very easy on tires, despite the great weight that the tires have to carry. This is attributed to the construction by which the weight of the driving parts is removed from the rear axle and carried by the springs. Some of the Goodyear tires that were fitted to the first machines put in operation in October, 1907, are still in use, having run 15,000 miles, and evidently having enough rubber left for 5,000 more miles.

The twenty-five new 'buses are being equipped chiefly with Hartford tires, a contract having been given recently for twenty-five pairs of single tires for the front wheels and an equal number of twin tires for the rear wheels, constituting the largest single order for motor omnibus tires ever placed in America. It is a "repeat" order, as many of the earlier vehicles were already fitted with Hartfords. Not all of the tires on the new 'buses will be Hartfords, however, as about ten spare rear wheels and half as many front wheels are held in reserve to be supplied in case of damage to tires or wheels on 'buses in use. Consequently, a considerable number of Goodyear tires will be put on the new machines, while a very large proportion of them are fitted to the thirty vehicles of this class previously put in operation.

The company is operating ten American-built gas-electric omnibuses, constructed by the General Electric Co., and fully illustrated and described in the November, 1908, issue of THE COMMERCIAL VEHICLE. These machines are particularly economical of tires, due in large measure to the flexible electric drive which permits of gradual pick-up of the load in starting after the frequent stops. The electric transmission, with its smoothness of operation and freedom from noise, is especially pleasing. Most of the troubles that have taken the cars out of service temporarily have been due to the gas engines, which were in the nature of experimental motors, built quickly for this especial purpose, because no other of suitable type were available within the required time. These are now being replaced by De Dion engines, this make having been selected because of the satisfactory service the engines in the imported 'buses have given, and also with the object of having the equipment as much alike as possible, which has its obvious advantages in the repair shop and garage.

INCREASED COST OF KEEPING HORSES

One of the largest teaming companies in New England has made the following interesting comparison of what things cost seven years ago and what they cost to-day:

		Jan., 1902.	Jan., 1909	Per cent rise.
Feed:	Hay	$14 per ton	$18.00	29
	Oats	26c to 34c per bu.	.60	100
	Straw	$12 per ton	20.00	67
Labor:	Two-h. driver	$11 to $12 per wk.	15.00	25
Accidents:	Insurance	$15.00	25.00	40
Maintenance:	Repairs		.....	40

This makes just fifty per cent. increase in the cost of keeping teams, which shows an important addition to the expense of delivering coal.—*The Retail Coalman.*

OWING TO A DIFFERENCE between the postal authorities and the contractor who supplies the wagons used for collections in Rochester regarding an increase in the contract price, there is some likelihood that all the collecting and despatching of mail in Rochester will be done by motor vehicle. A test was made with a large Selden car in February, with the superintendent of delivery and superintendent of carriers aboard, and a tour of the city, following all the routes covered by the electric mail cars, wagons and foot collectors, was made in two hours. The result has been reported to Washington. The present service with five trolley mail cars, six wagons and a number of men on foot for gathering the mail and several other outfits for carrying the mail to and from the stations costs about $17,000 a year.

RURAL DELIVERY BY MACHINE

Increased use of motor vehicles in rural free delivery service of the U. S. Post Office would greatly extend the radius covered, or, at any rate, make it possible if full advantage were taken of the greatly increased speed at which the carrier could cover any given distance. Or in cases where the route was populous rather than lengthy it would permit of more frequent deliveries. Should the plan of a Government parcels post be adopted the motor vehicle would be a very important agent in its full development. Heretofore we have shown vehicles used for mail delivery, usually as they appear in town, and we here show a Kiblinger light mail wagon in operation, the carrier being about to deposit the mail in the sheet metal box in front of a typical country house. The location of the free delivery boxes by the roadside saves much time that would be lost in approaching and leaving a house. In the case shown it would not have been necessary for the carrier to leave his seat in the vehicle except for the purposes of "having his picture taken." While the village post office may have lost some of its picturesqueness because of the free delivery, yet the practical advantages of the new system are appreciated by none more than the rural resident.

RURAL DELIVERY BY MOTOR VEHICLE

A MOTOR TRUCK DELIVERY SERVICE has been established by Marshall Field & Co., between Chicago and the suburbs to the west of that city, which relieves the firm of a lot of shipments that previously were sent by railroad.

RICHMOND, VA., POLICE PATROL

Modern methods of transportation have been adopted by the police department of Richmond, Va., which has installed a motor driven patrol wagon, built by the American Locomotive Company at its plant in Providence, R. I. The new wagon consists of a special body fitted to a 40 horsepower chassis of the regular A. L. Co. type—four-cylinder motor, selective change-speed gearset, and side chain drive to the rear wheels. Pneumatic tires are fitted to the standard artillery type wheels, and high speeds can be maintained over badly paved streets or rough roads, in case of emergency. The body has wired sides, permanent top, and side and front roll curtains, and tail board and stanchions for the officer in charge of the "live" load. The new wagon is illustrated herewith.

AMERICAN LOCOMOTIVE POLICE PATROL WAGON

COUPLE GEAR TROUBLE WAGON

A very interesting "mixed system" trouble wagon, which has been supplied to the Chicago City Railway by the Couple Gear Freight Wheel Company, is shown in the accompanying reproduction of a photograph. The wagon is of standard Couple-Gear type as far as the transmission and gearing in the wheels is concerned, and is the regular 3 1-2 ton chassis. The power equipment consists of a four-cylinder, four-cycle gas motor, with cylinders 5 inch by 6 inch, direct connected to a 10 kw. generator. The road speed can be varied by the operator from a crawl to a maximum of 30 miles an hour.

COUPLE-GEAR TROUBLE WAGON FOR CHICAGO

The outside of the body is built up of small tool compartments and the open space in the center is left for the loading of heavy and long repair equipment. At both the front and rear the wagon is fitted with pulling irons so that it is capable of replacing derailed cars on the rails or pulling off broken down wheeled vehicles which may be an obstruction to the operation of the street cars. The wagon is also fitted with a telescopic tower (not attached when the photograph was taken) for working on overhead wires. The wagon has been doing excellent service and its work is being watched by officials of the operating departments of other street railways. There is certainly a large field for the installation of machines of this type.

DEMONSTRATIONS OF MIXED SYSTEM

Mixed systems of drive, especially for heavy vehicles, have always been an attractive subject for investigation and experimentation with engineers both abroad and in this country. These usually include a combination of gas motor, as the prime mover, and electric current generator, with electric motor drive at the road wheels. One of the most notable recent installations of machines of this type is to be found in the additions to the omnibus service on Fifth Avenue, New York.

The Electromotive Company, of Chicago, has been working along this line of development for some time and has made practical demonstrations of its system in the reconstruction or equipment of old commercial vehicles of the storage battery type with mixed drive. The Armour interests of Chicago have had a 5-ton machine equipped with the Electromotive system in service for a considerable number of months hauling heavy goods, such as ammonia cylinders, glycerine, soaps and glue, from the stock yards plants to various steamship and railroad freight depots.

RECONSTRUCTED MIXED SYSTEM 3-TON TRUCK

Another machine to which the equipment has been applied is a 3-ton furniture truck operated by Alexander H. Revell & Company, of Chicago. This latter machine is here illustrated. In it the gas motor and electric generator have been located in a compartment below the driver's seat, and the drive to the rear wheels is by double electric motor suspended in the usual position. The latter are those with which the truck was originally fitted. The Revell truck weighs 8,700 pounds empty, and without driver aboard. Comparative tests have been made between this machine and others fitted with mechanical transmissions and have proved very satisfactory, according to the reports of the electric company.

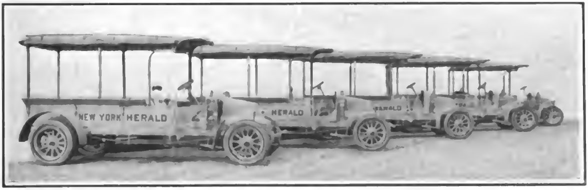
Certain details of the electrical apparatus of the system are now the subject of patent application by the Electromotive Company, which has offices in the Monadnock Block. It is the intention of the company ultimately to interest truck builders in this system of transmission and have them adopt it for their regular output.

NEWSPAPER DELIVERY BY MACHINE

After tentative trials with various types of commercial motor vehicles, the *New York Herald* and *Evening Telegram* placed in service last month, at the New York office of publication, a complete fleet of gas motor vehicles for the distribution of these dailies to the various railroad depots and city and suburban newsdealers. To start the service, eight machines have been installed, the chassis being imported from the Renault factory in Paris and fitted with bodies here by the Schildwachter Carriage Co., of New York. Seven of the machines have a carrying capacity each of 3,400 pounds, and are fitted with 14-20-horsepower four-cylinder motors, 3¾-inch bore and 4¾-inch stroke. The other machine is of a lighter type, with carrying capacity of 1,800 pounds, and equipped with two-cylinder 10-14-horsepower gas motor, having cylinders 4 inches by 4¾ inches. On the larger machines the body space is 11 feet 6 inches by 3 feet 11½ inches, on a 144-inch wheelbase. The tread is 66 inches, and the wheels are 34 by 4½ inches, fitted with pneumatic tires, single in front and dual on the rear wheels. The weight of these machines is 3,000 pounds.

The smaller wagon has a body space of 9 feet 10 inches by 3 feet 4 inches on 118-inch wheelbase, with 58-inch tread. The wheels are 34 by 4 inches, also fitted with pneumatic tires, and the weight of the vehicle is 2,200 pounds.

In all the machines the power plant and transmission system follows the familiar Renault pleasure car practice; water-cooled vertical motor, with tubular radiator fitted in front of the dash, and thermo-syphon system of water circulation, sliding gear change-speed mechanism and shaft drive to the rear live axle. The frame is of pressed steel, with trusses stiffening the side members. The bodies have been made with great care by a concern having an extensive experience with horsed vehicle construction for business purposes. They are built with sides 12 inches high, with flared racks 8 inches wide, and the tailboard is hinged and fitted with spring catches to keep it in position when running. The three-ply wood top is supported by tough-wood verticals, and under the extension over the driver's seat there are hinged clamps for carrying spare tires. The center line of the top is 68 inches from the floor of the body. Heavy-roll waterproof curtains are fitted to the sides and ends.

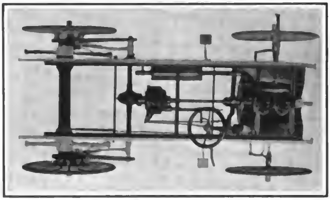


RENAULT MOTOR WAGONS INSTALLED BY NEW YORK HERALD FOR NEWSPAPER DELIVERY

These vehicles will be cared for in a garage owned by the newspaper company, on Thirty-seventh street, between Tenth and Eleventh avenues, where arrangements are now being made for the installation of various machine tools and bench equipment.

CHASE LIGHT DELIVERY WAGON

The mechanical simplicity of the Chase two-cylinder gas motor wagon is shown in the plan view of the chassis herewith. The motor is a two-cycle, air cooled, and the transmission includes a two-speed and reverse planetary gearset, bevel gear driven countershaft, and double side-chain drive to the rear wheels. This wagon is of the high-wheeled type and has a load capacity of 1,000 pounds, maximum. It is usually fitted with an open body.



CHASSIS OF CHASE LIGHT DELIVERY WAGON

The use of motor vehicles has more than doubled in Great Britain and Ireland during the last three years, according to a report by Vice-Consul A. D. Platt, of Dublin. The increase has been nearly uniform in England, Scotland and Ireland. British manufacturers now consider themselves practically safe from serious foreign competition, and besides improving their products are concentrating their energies and resources to increase efficiency and reduce expense.

OF INTEREST TO VEHICLE BUILDER AND BUYER

Certain changes which occurred last month in the personnel of the Reliance Motor Truck Co., of Owosso, Mich., gave rise to a great variety of rumors, some of which remain unidentified as facts. A surprising amount of secretiveness on the part of those interested has made it impossible to publish any frank and authoritative announcement. This mixture of fact and rumor asserts that Fred O. Paige, who has been president and general manager of the company, has severed his connection with it and has taken with him H. A. Wilcox, formerly chief engineer of the company; that these gentlemen will immediately organize a large company to build motor trucks with an improved type of gas motor power plant; that a controlling interest in the Reliance Motor Truck Co. has been purchased by the General Motors Company, which is said to be a holding corporation, owning the Buick and Olds pleasure car plants; that this General Motors Company, which has an office at 103 Park Avenue, New York, will offer part of its capital stock at public sale; that there will be no change of any sort in the management or methods of the Reliance Motor Truck Co., except that a new president and general manager will be elected; that Mr. Wilcox has formed a connection with certain powerful Eastern financial interests with a view to the production of motor trucks by them on a large scale; that Mr. L. B. Saunders will continue to conduct the sales of the Reliance motor truck with increased responsibilities as an official of the company.

The name of the Auto-Car Equipment Co., of Buffalo, has been changed to the Auto-Car Manufacturing Co., and the capital stock has been increased to $250,000. On May 1 the company will occupy its new buildings at Elmwood and Hertel avenues, Buffalo, which are nearing completion. The plant will be one of the most complete commercial vehicle plants in the country in both construction and equipment and will have a capacity for an output of about 1,000 machines a year. The Auto-Car Equipment Co. is one of the oldest manufacturers of commercial vehicles in America.

After a heavy snowfall in St. Louis last month the shipping yards and streets adjacent to the Anheuser-Busch brewery were cleared of the snow in a novel way so that it would not interfere with the movements of the company's service of fifty motor trucks and delivery wagons. C. A. Marien, superintendent of the company's large private garage for commercial vehicles, was out early in the morning and put seven men at work constructing a huge snow plow, which was finished in twenty minutes. Then a big five-ton Couple-Gear electric truck was hitched to the plow and dragged it over the snow-covered drives and streets around the brewery. The plow was loaded down with a dozen sacks of sand and ten men. Inside of an hour a clean sweep had been made of the snow, some of the streets being cleaned their full width. The truck showed remarkable pulling power, and none of its four separately driven wheels slipped in the snow.

The Post Motor Company, of New York, announces its removal from 1623 Broadway to 229 West Fifty-fourth street, where there will be garage and repair facilities available for purchasers of the commercial vehicles handled by this company. The point is well taken that as this garage will be for work vehicles exclusively better attention can be given to them than in establishments where pleasure cars have the right of way. Mr. C. R. Mabley, who is widely known in the motor vehicle field, is manager of the compnay.

Something quite out of the ordinary in motor-truck catalogues is discovered upon looking within the gray covers of the new catalogue of the Packard truck, issued by the Packard Motor Car Co., of Detroit. It is thoroughly well written, well designed, illustrated and printed on superior paper. While it is very attractive, there is nothing about it that is so elaborate as to be out of accord with the serious subject presented. The text is brief, the points made are brought out incisively and the arguments are convincing. The reading matter deals first with the Packard three-ton truck in general and the organization that produced it; then with the adaptability of the truck to different kinds of work, then to its efficiency, after which are given the general specifications, the specifications of the power plant and transmission and finally of the running gear. The headings of the different pages show different designs of the truck, with the design number under each. The drawings are reproduced in white on an olive-colored tint block.

The death of Mr. Henry Timken, president of the Timken Roller Bearing Axle Co., of Canton, O., occurred at San Diego, Cal., March 16. Mr. Timken was a pioneer in the manufacture of bearings for wheeled road vehicles, and began business many years ago in St. Louis when that city had only 25,000 inhabitants. Although seventy-six years of age, Mr. Timken was unusually sturdy and rugged, and his fatal illness was of brief duration. For twelve years he had lived in San Diego, and the first sorrow to mar his happiness came with the death of his wife last December.

The York Carriage Co., of York, Pa., one of the large builders of carriages in the State of Pennsylvania, is erecting a two-story building, 200 by 45 feet in size, to be used exclusively for the manufacture of commercial motor vehicles. The drafting department is at present busy on the work of getting out plans and so on for the machines to be constructed, but the company is not yet ready to give out fuller information. It is known, however, that it has great confidence in the early development of the commercial vehicle on a large scale and is preparing to take advantage of the growth. There is no intention, however, of giving up the manufacture of horse-drawn carriages in the immediate future. The new factory is to be ready for occupancy this spring.

Announcement has been made that the American Locomotive Co., of Providence, R. I., is now prepared to receive and fill orders for the motor trucks which it has been perfecting during the last three years. Several of these trucks have been given thorough tests in the severe and exacting service of express companies in New York City for nearly two years.

An interesting exhibit at the stand of the Goodyear Tire & Rubber Co. at the Boston motor car show in March was a Goodyear solid rubber tire that had been run for several months on one of the double-deck motor omnibuses operated on Fifth avenue, New York. Despite the heavy load, the long mileage and constant use in all kinds of weather, the tire was still in good condition and showed little if any wear, although somewhat thinner than when first put on the omnibus. The 100 Goodyear air bottles displayed at the Grand Central Palace show in New York were hauled there by a rapid motor truck which made the trip from Pontiac, Mich., over the frozen and icy winter roads on a set of Goodyear hard rubber base tires. The remarkably tough tread, formed by a secret process, did not suffer severe cuts such as might have been expected from contact with the sharp-edged pieces of broken ice and frozen clay encountered during much of the trip. And despite the severe wrenchings due to ruts, the driver did not report a single instance of a tire coming off or even working loose. The truck left Pontiac on December 20 and arrived in New York ten days later.

In order to avoid all confusion as to the name of the car which it manufactures—the Ewing—the Cleveland Autocab Co., of Geneva, Ohio, has changed its name to the Ewing Automobile Co. There will be no change of policy, however, and all negotiations entered into by the original company will be carried out by its successor.

The Commercial Vehicle

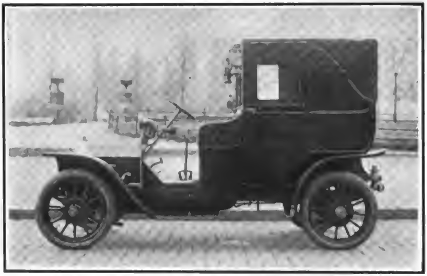
Vol. IV May 1909 No. 5

BROADWAY DEALERS ENTER TAXICAB FIELD

A Superior Service to Be Established on May 1 by Wyckoff, Church & Partridge, a Leading Concern in the Pleasure Car Trade in New York City—Rockwell Cabs to Be Used

OF the many developments in the taxicab field during the past month in many parts of the country, the most important is the announcement of the plans of the newly organized W. C. P. Taxicab Co., of New York City.

Beginning May 1, this company is to operate a service from the garage of the well-known automobile dealers, Wyckoff, Church & Partridge, at Broadway and Fifty-sixth Street. Rockwell cabs, built by the Bristol Engineering Co., of Bristol, Conn., will be used, and it is asserted that seventy-five will be on the streets by June 1 and about 200 by September next.



ROCKWELL CAB FOR W. C. P. TAXICAB COMPANY OF NEW YORK

The cabs will be fitted with special bodies of the usual landaulet type, paintede orange yellow and trimmed with black and having black hoods over the engine as well as black leather tops. The running gear will also be yellow. On the radiator and on each door will appear the W. C. P. crescent monogram. The drivers are to be dressed in uniform consisting of long double-breasted top coat of blue-gray with black collar and cuff bands edged with orange, and black cap trimmed with orange cord and an embroidered orange crescent monogram. An important point in which the new cabs will differ from the majority of taxicabs now operating in New York is that the taximeter instruments to be fitted to them will be driven from the front wheels instead of the rear wheels. This is the method that is considered to be fairest to the patrons of the service, and it is one that is likely soon to be made compulsory by ordinance in New York, Chicago, Washington and Boston. It is probable that Jones taximeters will be fitted to the first seventy-five cabs put in operation, but the Bristol Engineering Company is at work on a meter of its own which it hopes to have in readiness to be applied to the subsequent cabs to be delivered to the W. C. P. Taxicab Co.

Drivers are to be selected men picked from the large list of chauffeurs compiled by Wyckoff, Church & Partridge during the years in which they have conducted a large motor car agency and retail business in New York.

In an endeavor to give the public an unexcelled service and to eliminate so far as possible all causes for complaint and dissatisfaction, the company has already taken steps to provide cab users with blank forms and return post cards, inviting criticism and comments.

The rates to be charged will conform to the tariff adopted this spring by the New York Taxicab Co., and the new Taxi-Service Co., of New York; that is, 50 cents for the first half mile or fraction and 10 cents for each subsequent quarter mile. These rates are considerably less than the legal cab rates that have prevailed for years during the regime of the horse cab, which is $1 per mile or fraction thereof.

Organization of the W. C. P. Taxicab Co. developed out of the efforts of C. F. Wyckoff and E. S. Partridge, of Wyckoff, Church & Partridge, and A. R. Rockwell, F. E. Moscovics and DeWitt Page, of the Bristol Engineering Co.—men who are directly responsible for the design and construction of the Rockwell cabs. An interesting working arrangement has been decided upon, whereby the executive work in connection with the service, such as direction of the affairs of the company, correspondence, making of contracts, receipt of telephone calls and all clerical work, will be taken care of by the Wyckoff, Church & Partridge interests, while the operating end will be managed by the interests representing the Bristol Engineering Co., which has leased the basement of the garage at Broadway and Fifty-sixth street, and will assume charge of hiring and paying the drivers, furnish all supplies and generally be responsible for the rolling stock and garage.

There is ample room in the basement of the model garage and sales building erected three years ago by Wyckoff, Church & Partridge, for the accommodation of the seventy-five cabs it is expected to have in operation before fall, as the space now devoted to "dead" storage will be given up to this purpose and the storage and charging of electric vehicles will be discontinued. Later, as the taxicab business develops, additional space can be devoted to it either by confining the storage of private motor cars to owners of Stearns cars alone (which the concern sells) or by the addition of two more stories at the top of the present building, whose foundations and lower walls were built with the expectation of ultimately running the building up to a height of eight stories.

The Rockwell cab, which was brought out last winter and was exhibited at the Grand Central Palace show, shows evidence of good designing and superior workmanship. It embodies the usual up-to-date characteristics of the landaulet type of vehicle used for taxicab purposes but departs in a number of important respects from conventional lines. The engine, for example, has four cylinders cast in one block with valves all on one side and with bore of 3⅝ inches and stroke of 4⅛ inches. It is rated at 18-20 horsepower. Ignition is by Bosch high-tension magneto with fixed spark; lubrication by gear-driven pump taking oil from a reservoir in the base of the engine; and cooling by geared centrifugal pump. The steering wheel is on the left, where the driver can see better to avoid passing vehicles, and the change speed levers and hand brake are in the center of the floor board at the driver's right. They rise directly from the top of the gear box, in which is housed a three-speed transmission system with special interlocking gears, whose shafts are mounted on New Departure ball bearings especially designed to take end thrust. A three-plate floating ring clutch of special design and mounted on ball bearings is employed.

The front axle is very heavy in design, to withstand all shocks, and the hubs are provided with ball bearings. The rear axle is of the full floating type with ball bearings designed to take end thrust. A double set of brakes —internal and external—operate on the rear wheel hubs. The chassis frame is of extra heavy pressed steel channels, the dash cast aluminum and the running boards stamped steel. The vehicle has a wheelbase of 106 inches, tread of 53 inches and the wheels are fitted with 32 by 4-inch pneumatics. The turning radius permits the machine to be turned around in a 50-foot street. Accessibility of the various parts was a point especially aimed at in designing the cab, and it is claimed that the power plant can be removed in twenty minutes.

TAXI-SERVICE MEN INVADE PHILADELPHIA

INCORPORATION papers were filed in Trenton the middle of April for the Taxi-Service Co., of Philadelphia, with authorized capital stock of $1,000,000, of which one-half is in 7 per cent. cumulative preferred and the rest in common stock. Although this is a separate and distinct organization from the Taxi-Service Co., of Boston, and the Taxi-Service Co., of New York, a number of the principal stockholders appear in all of the companies, in which Harlan W. Whipple, Winthrop E. Scarritt and others are leading spirits.

Within the last month the recently formed Taxi-Service Co., of New York, which began operations by purchasing outright the business of the W. H. Seaich Co., that formerly operated 60 American Locomotive cabs in New York City, has taken over the business of the Hexter Taxameter Co., which has been operating upward of 100 Sultan taxicabs and a dozen touring cars.

These developments have caused a renewal of the newspaper reports of a "taxicab trust" or combination, despite the fact that there are several other companies in New York that are operating a larger number of cabs each and that there are more than a score of small taxicab companies and liverymen that have embarked in the new business during the last two years. Although President Whipple denies knowledge of any intention to form a taxicab trust, he asserts that the public would be the gainer if the smaller companies could be merged into larger consolidations or bought up outright.

"The operation of all the taxicabs in the city by a single company instead of a dozen companies would save a lot of duplication," he said. "It would save paying many executive officers, maintaining a dozen garages and do away with the costly competition in obtaining desirable stands. One hotel asked $300 a month as rental for its taxicab stand regardless of the business done by the leasing company. It got the cab companies to bidding against one another and so obtained its price. Consolidation of the taxicab companies might be arranged by an exchange of securities. Something of this sort is sure to come in time. If I could effect a consolidation of all the companies, the first thing I would do would be to put down rates. We have always done this in the street railways and gas companies with which I have been connected and found that it paid by the increased business done."

There is no reason to think, however, that either the New York Taxicab Co., which operates more than 600 Darracq cabs, or the New York Transportation Co., with more than 100 Delahaye and Atlas gasoline cabs and several hundred electric hansoms and broughams, would enter a combination of the sort. Each is strong enough in resources and experience to stand alone. That many of the smaller companies will, from time to time, be sold out and combined with others is to be expected in a new field of enterprise into which many have entered hastily like an influx of boomers to a new mining district.

CHICAGO PUBLIC CAB OWNERS ORGANIZE

THE new organization, known as the Automobile Transportation Association of Chicago, promises to be one of the most useful that up to this time has been formed for the benefit of owners and operators of livery cars and taxicabs and the people who pay to ride in them.

The association was formed about a month ago for the purposes of promoting the business of such vehicles and protecting the men who operate them and the citizens who use them.

One of the primary reasons for the organization of owners was the organization of the chauffeurs, who, it is claimed, almost at once began making demands on the owners of livery cars and taxicabs. This in a measure forced the owners to get together in order to meet the drivers.

At the meeting at which the organization was effected the following concerns were represented: Owen H. Fay Livery Co., Automobile Taxicab Co., Coey Auto Livery Co., Dan Canary Taxi Service Co., and Kenwood Taxicab Service. Other concerns that are expected to become members are the Imperial Auto Livery Co. and the Waldron-Shaw Taxicab Co.

One of the first matters taken up by the new association was the regulation of rates of fare for livery cars and taxicabs. A committee was appointed to confer with city officials with the object of agreeing on a schedule of rates, that is to be uniform and by which it is hoped to protect the people from overcharge. An effort is being made to secure two different schedules, one to be known as No. 1 and the other as No. 2. The former will apply to vehicles carrying one or two passengers, and the other to two or more. No. 1 contemplates a charge of 50 cents for the first mile or fraction, 10 cents for each additional quarter of a mile, and 10 cents for each six minutes' standing.

It is hoped to secure a No. 2 schedule of 70 cents tor the first mile or fraction, and 10 cents for each additional fifth of a mile. The last-named schedule applies only to vehicles carrying more than two passengers. Some of the cab companies are now operating under both No. 1 and No. 2 schedules; others are making use of only No. 1 or a single tariff for all kinds of loads. Uniformity in this matter is urgently sought, and the association hopes to bring it about.

The double tariff is desirable for several reasons. One is that the additional passengers put increased weight on costly tires. Then there is an inequality in the operation of taxicabs that is sought to be overcome, in a measure at least. That is, that many of the cabs are compelled to run light to get a passenger, or return empty to the station after service has ended. This "dead mileage" has been a serious drawback to profits of the service, and it is hoped that a new schedule that provides more liberally for the carriage of more than two passengers will in a measure reimburse owners.

Owen H. Fay, who is the president of the new organization and who is the largest livery owner in Chicago, having the entire business of such places as the Auditorium Annex Hotel, the Stratford, Great Northern, Palmer House, Union League Club, Illinois Athletic Club, and the Women's Athletic Club, is selling horses and putting in power vehicles every week. He has had a horse livery for more than thirty years. By the end of the present year he will have sold every horse in his barns, and be operating nothing but power vehicles.

The Emery concern, one of the largest livery companies in Chicago, sold at auction his entire horse livery on April 8 and 9, and power vehicles, Elmore and Studebaker cars, are being installed.

Adams Brothers, on Forty-third street, are turning their entire establishment into a garage, which now is nearly completed. The firm already has commenced putting in cars for livery purposes.

It is claimed that conditions are helping along the growth of the power livery business. While horse vehicles are lower in price, the cost of horseflesh and feed is higher than ever. The use of motor vehicles seems to have had no effect in the reduction of cost of horseflesh, and this has an influence in hastening the use of the commercial vehicle.

TAXICAB REGULATION IN CHICAGO

There has been pending in committee since the last week in March a bill introduced in the Chicago Council by the Assistant Corporation Counsel, H. W. Hayes, for the regulation of taxicabs and inspection taximeters. The measure provides a No. 1 tariff for one or two passengers and a No. 2 tariff for more than two passengers. It prohibits the driving of the taximeter from the rear wheel or rear axle, and provides for the regular inspection of all meters semi-annually by the city inspector of weights and measures, with inspection at any time upon complaint and payment of a fee of 50 cents, which fee is to be returned and charged to the operating company if the meter is found inaccurate.

One clause prohibits the application of a taximeter that has been tested for wheels of a given diameter to cars fitted with smaller wheels, while another forbids the setting of the instrument to register under tariff No. 2 when only one or two passengers are carried. The driver must, before turning down the flag at the end of a service, announce the fare unless the vehicle has been hired by the hour.

The rates fixed by the ordinance are as follows:

TARIFF NO. 1

First half mile or fraction thereof	30 cents
Each quarter mile thereafter	10 "
Each six minutes waiting	10 "

TARIFF NO. 2

First one-third mile or fraction thereof	30 cents
Each one-sixth mile thereafter	10 "
Each six minutes waiting	10 "

No charge shall be made for a distance of less than one mile traversed by a cab in responding to a call, but beyond that distance a charge may be made of 20 cents a mile or fraction of a mile. Nor does the bill allow a waiting charge to be made when a cab arrives at a place of call earlier than the time specified and has to wait for the passenger. The legal waiting time is described as the time during which a cab is not in motion, beginning with its engagement in the street or at a stand, or with its arrival at the place of call at the time designated.

It is provided that any taxicab may be hired by the hour, but the passenger is required to specify such service when engaging the vehicle, and the driver must then turn the flag down in inoperative position. The fare is fixed at $3 for the first hour or fraction, and $2.50 for each subsequent hour or fraction, when one or two passengers are carried; while for more than two passengers the rate is $4 for the first and $3 for each successive hour.

Passengers may carry hand baggage free, but a charge of 20 cents may be made for carrying a small trunk outside.

Penalties for violating any of the provisions of the ordinance or for using a taximeter that registers inaccurately, are fines of from $5 to $50, in the discretion of the court.

A NEW CHICAGO COMPANY

Operations were begun in Chicago in April by the newly organized City Motor Cab Co., of which John D. Towne and John Borden, two young men of social prominence and well-known motorists, are proprietors. Downtown headquarters of the company are located at 97 Randolph street, and for the present the business is to be conducted along conservative lines pending the placing of large orders for machines and the erection of a new garage. A first order for ten machines was placed with the Ewing Automobile Co., formerly the Cleveland Autocab Co., of Geneva, O., whose product was exhibited at the Grand Central Palace show in New York last January. A garage, 100 by 100 feet, to cost $15,000, is being erected at Huron and Fairbanks streets.

The Ewing taxicabs, as they are called, were designed by L. P. Mooers, formerly designer for the Peerless Motor Car Co., and are excellent examples of engineering construction. The engine has four cylinders cast in pairs and develops 20 horsepower. A selective three-speed transmission is employed, with propeller drive to a live rear axle. The construction is rendered unusual by the placing of the steering column on the left side, while the control levers rise from the change-speed gearbox through the center of the floor boards in front of the driver's seat and are manipulated by the right hand.

The bodies of the cabs supplied to the City Motor Cab Co., break back of the side doors and are painted battleship gray with black molding and vermilion striping. The chases are vermilion with black striping. Upholstering is in steel gray whipcord.

TAXICABS FOR SAVANNAH

Work has been begun on the construction of a two-story garage 90 by 90 feet on the main business street of Savannah, Ga., to be used as the central station for a new taxicab service which the Savannah Taxicab Co. expects to have in full operation within 90 days. The garage will have concrete floors, power elevator and all modern improvements for the accommodation of motor vehicles.

Service will be started with ten taxicabs, and the company is now in the market for the purchase of that number of cabs that can be bought at a certain price. Rates to be charged patrons of the service have not yet been decided upon.

Application for incorporation papers was filed in March by the attorney acting for Joseph Lichtenstein, of Atlanta; M. Wilensky, Charles Garfunkel and W. O. Hawley, of Savannah. The capital stock was placed at $50,000, with the privilege of increasing the amount to $100,000. Mr. Lichtenstein will be president and Mr. Wilensky vice-president of the company.

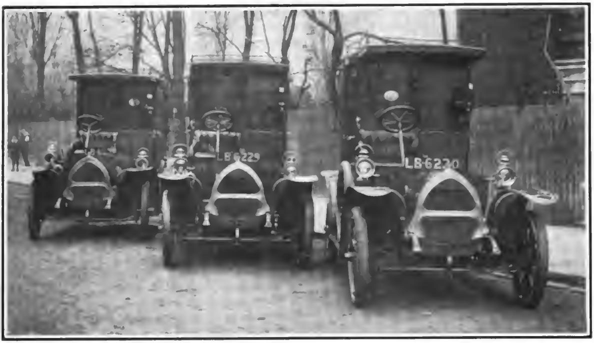
ABANDONS PERCENTAGE WAGE BASIS

Drivers of the cabs of the Taxi-Service Co., of Boston, are now paid regular weekly wages, instead of a percentage of the gross daily earnings of the cab that each driver runs. Manager A. E. Morrison believes that the change of system will result in the discouragement of reckless driving and increase the comfort and peace of mind of the passengers.

"The practice of paying drivers a commission instead of a regular salary is all wrong," he maintains. "When we began operations in Boston the method in vogue was to pay drivers 20 per cent. of the gross receipts, and charge them for the gasoline used, and naturally we put our men to work on that basis. It has never proved satisfactory, as the drivers were constantly rushing passengers to their destinations and frightening the timid ones, so that they would hesitate to again take a taxicab. Then they rushed back, in order to get another job. This method also brought forward many undesirable drivers, as their work was a gamble, pure and simple. By the new method the drivers receive a regular weekly salary and do not have to rush around like wild to earn a decent living. This eliminates the reckless drivers, and insures the patrons of the company safety and comfort."

ADAMS MOTOR CABS IN LONDON

As most of the motor cab work in London is done by foreign machines any English machine that can stand up to the hard work in the British metropolis must be considered quite a high standard vehicle. In the above keen competition which is going on, the British Adams cab has lately won notice. This is turned out by the Adams Manufacturing Company, Ltd., of Bedford, Eng., and operated chiefly at the commencement of its career by the North London Motor Cab Company, Ltd., in whose employ the



BRITISH BUILT ADAMS MOTOR CABS IN LONDON—NOTE CHARACTERISTIC RADIATOR FRONT

first three have done so well that an order for seventeen more has been placed. During the first three months running in town, these cabs at times covered as much as 180 miles a day, and averaged about 20 miles to the gallon of gasoline for the whole period, which may be well considered creditable.

The Adams cabs are fitted with the two-cylinder 10-12 horsepower English built Aster engine. The point of interest from a technical point of view is the gearset, which is of the planetary type, operated solely by foot pedals, in fact the whole control is on this principle, which has given quite good results for some years. The final drive is naturally by live axle, this becoming almost compulsory with London cabs, as the police authorities refuse to re-license chain-driven vehicles of the cab type. One might mention finally the brass mounting of the radiator, which is in the form of the letter A. This has been quite an attractive advertisement, and no doubt has assisted to sell cars in other parts of the country, as well as in town.

TAXICAB RATES RAISED

A new schedule of rates was put into effect on April 8 by the New York Taxicab Co., following out a policy adopted when Mr. Hoskier succeeded Harry N. Allen as president of the company. It was found that at the rates formerly charged—30 cents for the first half mile and $1 an hour for waiting—the operating expenses ate up the profits. When the service was first started the charges were based on the only available precedent for similar service, which was the cost of operation and the earnings of the cabs in London and Paris. Time showed, however, that the tariff was too low, owing to the excessive "dead" mileage that had to be traversed with the empty cabs in going to places of call and returning to the station or stand after being dismissed, and the higher wages that had to be paid and generally greater cost of service. Consequently in the effort to bring the business to a profit paying basis, the rates were raised to an initial charge of 50 cents for the first half hour and $1.50 an hour for waiting. After the first half mile the old rate of 10 cents for each quarter mile is adhered to. The increased charge will fall heaviest upon those who call the cabs for rides of less than a mile or use them for visiting or shopping.

TIRE INFLATION ON TAXICABS

One of the very heavy items in the cost of maintenance of taxicab services is the repair and replacement of tires. Some of the larger operating companies contract for their tires on a mileage basis, simply paying the tire company a specified amount for each 1,000 miles run by their cabs on the tires furnished by the manufacturing company. But whether the tires are supplied on a mileage basis or are owned outright by the cab company, economy can be effected in the end by avoiding excessive tire wear and damage.

Insufficient inflation is claimed to be the cause of two-thirds of the tire troubles, and it is evident that in taxicab work, where cars are pounding all day long over street car tracks and defective asphalt and cobble pavement, the matter of inflation is of the utmost importance.

On account of the great damage done to tires by running them improperly inflated, a regular fixed schedule of air pressures has been computed, based upon the size of tire and weight of load. This has been improved upon by branding the proper number of pounds of air pressure on the side of Firestone tires where the chauffeur can see it every time he applies the pump. The recommended air pressures which are thus moulded into the tires are as follows: For 3½-inch tires, 60 pounds; for 4-inch tires, 75 pounds; for 4½-inch tires, 85 pounds; for 5-inch tires, 90 pounds, and for 5½-inch tires, 95 pounds.

There are many other points to be observed in the proper care of tires, foremost of which, perhaps, is the prevention of oil coming in contact with the rubber. Cabs are often negligently allowed to stand with the tires resting in oil puddles in garages or on the pavement.

MINOR TAXICAB NEWS

Will F. Lipman and Gay Lombard are copartners in the ownership of a new motor cab service, to be conducted with Renault cabs in Portland, Ore. An order was placed some time ago for cabs of this make of the four-cylinder 24-horsepower model. A rate of 50 cents for the first half mile and 10 cents for each succeeding quarter mile, with a charge of $1.50 an hour for shopping, has been adopted.

Hotel Broad, in Newark, N. J., has bought and put in service four motor taxicabs.

Because of reduced rates made necessary to meet competition, the profits of the New York Transportation Co. for the last fiscal year of the company were not so large as they would otherwise have been, President R. W. Meade told the stockholders at the annual meeting last month. The company is in good financial condition, however, and has no floating debt of importance, he said. The retiring directors were re-elected.

The Taxicab Service Co., of Detroit, incorporated with an authorized capital of $25,000, is operating a number of Chalmers-Detroit cars, with the Winton garage at 736 Woodward avenue as temporary headquarters. The cabs are distinguished by yellow bonnets. T. W. Henderson is president of the company; Hilliard Lyle, vice-president; George C. King, treasurer, and Lewis S. McCreary, secretary and general manager.

Houston, Tex., has its taxicab service, operated by the Texas Transfer Co., which is increasing the number of its cabs with a view to taking care of the summer business in and around the city.

Plans for starting a motor cab service in Chattanooga, Tenn., have been practically completed by a number of local business men who plan to put five or six machines in use at the start, and when the success of the enterprise is assured, to add some sightseeing stages for the accommodation of tourists.

A taxicab and sightseeing service is about to be launched in Akron, O., where the undertaking is being pushed by two out-of-town men and backed by local residents who have become interested. It is proposed to put two or three cabs and one large sightseeing machine at work in the beginning to carry passengers and also a heavy motor truck for draying and delivery work. Secrecy has been maintained regarding the names of the organizers and their plans.

Three motor cabs have been put at work in Knoxville, Tenn., by Charles McNabb. Provision is made for heating the interior during cold weather.

The Auto Cab Co., with headquarters at 27 North Champion street, has been launched in Youngstown, O., by J. B. English, of the Mahoning Lumber Co.; J. B. Tigue, of Sharon, and A. F. Parker, of Youngstown.

Paducah, Ky., has the distinction of possessing a taxicab service owned and operated by a colored man, Harry Anderson, who conducts a hack line and recently added a new Ford landaulet to his business. Several of the horses and hacks have been sold and other motor cabs are to be added.

A sentence of twenty years in the Sing Sing penitentiary was imposed on James G. Jamieson in General Sessions, New York, recently upon conviction of the charge of robbing Harold B. Thompson, a taxicab driver. Jamieson and another man hired Thompson to drive them through Central Park and in an unfrequented part of the park they stopped the cab and assaulted Thompson, tying him up and leaving him in the cab after robbing him of thirty dollars.

We are informed on good authority that the Olds Motor Works, of Lansing, Mich., is going into the manufacture of taxicabs on an extensive scale, and that one of the salesmen attached to the Chicago branch store has been put exclusively at work on the sale of the machines. A new company to operate with Oldsmobile cabs is soon to be organized in Chicago, and representatives have recently been at work there securing contracts with hotels, clubs and restaurants for stand privileges.

An investment of $30,000 has recently been made in new cabs for immediate delivery to the Atlanta Taxicab Co., of Atlanta, Ga. The orders were placed by A. L. Dunn and F. J. Cooledge during a visit to New York to study the taxicab conditions there.

Cab stand privileges at both the National and American baseball grounds in Boston have been secured for the summer by Manager William P. Barnhart, of the Taxi Motor Car Co., of Boston.

Chicago, Milwaukee and Madison capital is interested in a new project to start a taximeter motor cab business in Milwaukee, Wis. One of the principal men interested is Dr. W. L. Henderson, 96 Farwell avenue, of that city. The Chicago men are interested in taxicab building and selling concerns. Sites for a garage have been under consideration, and the plans contemplated starting the service before the end of April with four machines.

Fourteen taxicabs were saved from destruction by quick work in turning in an alarm of fire from the Forty-third Street Automobile Co.'s garage in Chicago last month and running the machines out of the building before the flames burst through the floor and it collapsed.

Plans have been filed by the Chicago Motor Cab Co for the construction of a garage near Huron and St Clair streets, on the North Side, Chicago.

New taxicab services have been started in Hartford, Conn., by the Capital City Auto Hack & Livery Co., using Mitchell cabs, and by an operator using the Elmore taxicab. A service with Maxwell cabs was started there some time ago and is doing well.

St. Petersburg, Russia, is starting boldly into taxicab operation, having received a first shipment of 150 cabs. These will occupy stands at the principal street corners, and men have been brought from Riga to be trained as drivers.

CAB INCORPORATIONS

Pittsburg Automobile Delivery Co., Inc., Pittsburg, Pa.; capital stock, $125,000. Incorporators, W. A. Pettis, A. Wood and V. A. Murray.

Taxicab Company, of San Antonio, Tex.; capital stock, $15,000. Incorporators: Roy Campbell, A. McFarland, and G. A. Mauermann.

Taxicab Service Co., Detroit, Mich.; capital stock, $25,000. Officers, T. W. Henderson, president; Hilliard Lyle, vice-president; George C. King, treasurer, and Lewis S. McCreary, secretary.

Berger Taxicab Co., Brooklyn, N. Y.; capital stock, $25,000. Directors: H. A. Berger, Wilbur Wing and Percival Wilds.

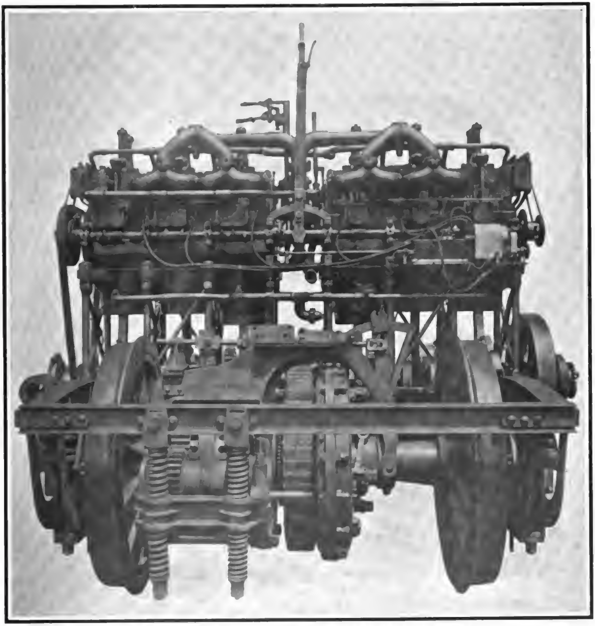
Green Taxicab Co., Brooklyn, N. Y.; capital stock $25,000. Directors, D. T. O'Brien, F. G. Strobel and Henry Jacobs.

GAS MOTOR FOR McKEEN RAILROAD COACHES

FROM time to time we have published articles about the McKeen self-propelled railroad coaches and through the courtesy of Mr. W. R. McKeen, Jr., we are now able to reproduce a photograph of the six-cylinder gas motor mounted on the truck of a coach with the transmission gear in position. This motor is of special interest as showing the application of the internal combustion engine to a difficult transportation problem requiring great flexibility and certainty of motor operation. The motor has an open frame—recalling torpedo boat engine practice—the cylinders being carried on forged steel columns. All the wearing parts are made of ample size and the lubrication system is very thoroughly worked out. The cylinders are 10-inch by 12-inch and at 350 r.p.m. the motor delivers 200 horsepower. From the crankshaft to the main driving axle the power is transmitted by a silent chain (running over suitable sprockets) through a friction clutch, and change speed mechanism giving two speeds in both directions. The cylinders are water-cooled, being fitted with copper jackets, and in cold weather the water circulation is used to heat the interior of the coach.

An air pump is direct-connected to the motor for supplying pressure for the car brakes, and the motor is started by air pressure instead of manually, as in an ordinary gas motor road vehicle.

McKeen self-propelled passenger coaches are now in operation on railroads in Colorado, California, Nebraska, Kansas, Illinois, Texas, Wisconsin and New York. In the last mentioned State they are operated by the Erie Railroad. Several different types have been worked out all of the same general exterior form, with the familiar



SIX-CYLINDER GAS MOTOR AND TRUCK FOR McKEEN SELF-PROPELLED COACH pointed end, side entrance, and round "port hole" windows. The different types are for passengers exclusively, for passengers and baggage, for freight, and for express and mail matter. The standard passenger coach is 55 feet long and has seating capacity for 75 persons. Its weight in working order is 60,000 pounds, and with the 200-horsepower gas motor it is capable of speeds in excess of 60 miles an hour. Some of the coaches in service on the Union Pacific average more than 6,000 miles per month. They are used both for fast interurban passenger service on main lines and also for the entire service on branch lines where the traffic does not make regular train operation profitable.

The shops of the McKeen company are situated in Omaha, and have a present capacity of one coach every week. This we are informed is to be enlarged in the near future. Gas motor switching locomotives and air compressors are also to be included in the regular output.

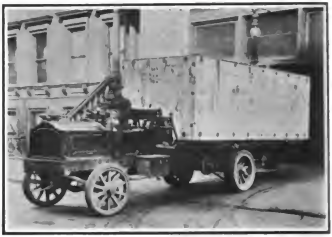
NEW YORK HORSE CARS TO GO

Finally it begins to look as if the execution warrant for New York's notorious old horse-drawn street cars that are the wonder and ridicule of all visitors to Manhattan was about to be signed. Receiver Whitridge, of the Third Avenue Railway Co., which controls several crosstown lines on which the horse cars are operated, has arranged to make tests of two new types of motor cars with the intention of displacing the horse cars when he has determined which of the two is most satisfactory and economical.

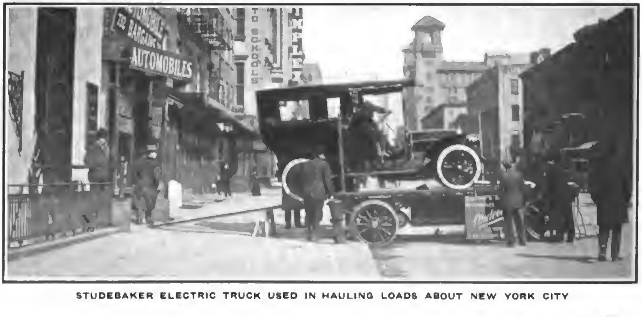
One of the experimental cars is an electric car built by the J. B. Brill Co., of Philadelphia, and supplied with current from storage batteries, and the other is under construction by the General Electric Co., of Schenectady, and is driven by an internal combustion engine. These will be put in operation in May. They are about 32 feet long and will seat 28 passengers. Cars of small size are required, as the tracks have many turns of short radius and the streets through which they run are too narrow and congested with traffic to permit of large cars. Overhead trolley wires are not permitted in Manhattan and the expense of reconstructing the crosstown tracks with underground conduits for electric feed rails would be prohibitive in the present financial dilemma of the street car companies.

TRUCK MAKERS AS TRUCK USERS

That commercial vehicle builders believe in taking their own medicine is demonstrated by the accompanying snapshots of machines taken in New York. The larger picture shows a Studebaker electric truck unloading a pleasure car at the salesroom and garage of the Studebaker company; this big building being a landmark on Broadway in the Longacre Square district. The truck is of a platform type, and very convenient for the rapid unloading or loading of complete automobiles either on their own wheels or boxed. The other engraving shows a Packard gas motor truck also carrying a complete automobile. In this case, however, the load is crated, the crate measuring 15 feet 3 inches by 6 feet 4 inches by 5 feet 7 inches. The machine within the crate is a regular Packard "30" touring car on its way from the railroad terminal in New York to the waterfront dock of one of the transatlantic steamship companies. The gross weight of the crate is 5,110 pounds, the tare being 1,745 pounds, and the net weight of the crate 3,365 pounds. The illustrations are also interesting as showing the utility of the work vehicle even in acting as a carrier for the self-propelled pleasure car.



PACKARD TRUCK IN THE BUILDER'S SERVICE



STUDEBAKER ELECTRIC TRUCK USED IN HAULING LOADS ABOUT NEW YORK CITY

AUTOGENOUS WELDING PROCESS

In the economical operation of motor vehicles for commercial purposes it is essential that as far as is practicable all machines be kept constantly in running condition. In common with all "machines" the commercial vehicle is not exempt from breakage in its component parts, unpreventable or otherwise, and this usually means that the vehicle is laid up for repairs. This involves loss of the driver's time and probably a serious interruption in the regularity of delivery or other service. For these reasons any device or method of repair that saves time in case of emergency is of special interest to the transportation manager. In the latter class belongs the autogenous welding process, by the use of which very speedy repairs can be made of broken components, including castings of every description. Breakages of cylinder castings due to freezing of the contents of the water jackets or to connecting rod or crank shaft failures are not uncommon, and under ordinary conditions necessitate a lay up of the vehicle while a new casting is being expressed from the builder's factory.

In effect the autogenous welding process consists of fusing the metal around a break by means of an oxy-acetylene flame produced with a special form of torch, and which has a temperature of 6,000 degrees. Additional metal is added when necessary by a rod of the same metal as the broken part; in fact the process is very similar to soldering with a blowpipe. But it differs radically from either soldering or brazing in that the parts to be united are not held together by any material of a lower melting point than themselves, but are joined by an actual union of the metals in contact.

In the accompanying photographs two pairs of cylinders are shown "before and after." Fig. 1 shows the cylinders as they came into the repair shop with the flanges broken, and Fig. 2 shows the same cylinders after repairs and ready to go back on their crank case again. During the process of welding the parts are mechanically held together so that when the job is finished the surfaces are true and the general dimensions are not changed.

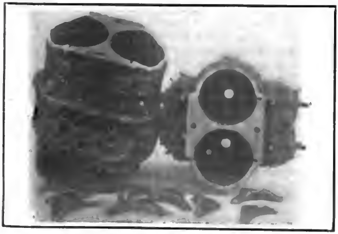


FIG. 1—CYLINDERS BEFORE REPAIRS

Familiarity with the process naturally develops much skill in its use and its applications to repair jobs that at first sight appear impossible. For example, a crack in the wall of a motor cylinder can usually be repaired by removing a portion of the water jacket, fusing metal into the crack to within, say, one-sixteenth of an inch of the bore so as not to spoil the inner surface of the cylinder, and then welding the piece which had been removed from the water jacket into its place again. The crack will still remain in the inner surface of the cylinder wall, but will not seriously interfere with the efficient operation of the motor.

The process is quite rapid and costs of repairs are small as compared with the expense of entire replacement of broken parts. For the accompanying illustrations we are indebted to the Autogenous Welding Equipment Co., of Springfield, Mass., which operates an extensive repair shop, making use of the Davis-Bournonville apparatus.

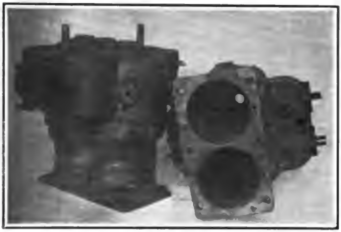


FIG. 2—BROKEN PIECES WELDED IN PLACE

The estimated value of the motor car product of the United States for the coming season is $150,000,000, according to figures prepared by Giles H. Stilwell, vice-president of the H. H. Franklin Mfg. Co. The manufacturers number 253, and of these 125 are makers of motor cars that are recognized as practical and of standard grade. The industry gives employment directly to 108,000 people and $187,000,000 capital is invested. Although the history of the motor vehicle in America extends over a period only a little more than a decade, 150,000 motor cars have been put into use in that time, and a 50 per cent. increase in annual production is in prospect for this year, the manufacturers having announced their intention of putting an aggregate of 75,000 new machines on the market.

In order to obviate the difficulties encountered in gathering wild rubber and facilitate production, artificial cultivation has been resorted to in various localities, says H. S. Firestone. Scores of millions of dollars have been lost in ventures of this character, many of them merely wild-cat promoted schemes. It is estimated now, however, that there are 300,000 acres of rubber plantations in Ceylon and the Malay region and 100,000 acres elsewhere, principally in Mexico, some of which have already started to yield and promise handsome returns to investors.

The Old Stage Coach between Pawhuska and Nelogony, in Oklahoma, by which residents of the Osage capital used to catch the train for the outside world in the early days of Oklahoma, has been supplanted by a motor stage.

OUR MACHINES VIEWED THROUGH FOREIGN EYES*

Analysis of the Methods of Construction of American Gasoline Commercial Vehicle Builders by a Well Known English Expert in Reply to a Critical Correspondent

HENRY STURMEY

THE points raised by a correspondent are interesting, and his explanation of the reason for the difference between commercial vehicle design in the United States and in this country is equally interesting, but, at the same time, I think, largely erroneous. When I say erroneous, I refer to his conclusion that the absence of competition in the home market has, in America, produced "some of the most uncanny commercial-vehicle freaks imaginable." It is true that, protected from the competition of European manufacturers, the American builder has been freer to follow the bent of his own inclination, but the fact that he has, in his designs, eschewed the pleasure-car models of Europe, does not necessarily imply that his design is incorrect. Some people are so imbued with the idea that the now almost universal design of the touring car is the only thing possible (because they see very little else) that every departure from it is, without further consideration, dubbed "a freak." In the United States, however, the designers have struck out lines for themselves, with due consideration for the requirements of their own country, and although they were much later in the field of the commercial vehicle than we—the commercial problem, except so far as the use of electric trucks is concerned, having only been seriously tackled within the last two years—they are, in some respects, superior to anything we have on this side. In the majority of cases, however, it must be admitted that the commercial vehicles of America fall behind our own. That situation is due more largely to lack of experience than to faults in design, for, when we come to examine the design, we shall find a practical reason for every departure which has been made from European pleasure-car practice.

QUESTION CONSIDERED BROADLY

In considering this question broadly, it must be remembered that American engineers, indeed, the American people, have great dislike of complication. They aim at simplicity of design in all things, with the object of reducing cost and simplifying manufacture. At times they may carry this principle too far and may lose something in efficiency. Successful design in anything, after all, is very largely a compromise. Your typical American argues, broadly: "Why should I pay a dollar for anything, when I can get something like it, for 50 cents, which will do my work?" And your American engineer, following the same principle, argues: "Why should I use two parts when one can be made to do?" If we will only recognize this, we can readily see the trend of thought which has led to American departures in design. In the end, I have no doubt they will succeed in working out a series of very practical vehicles; they may quite possibly develop some features (which are, because of imperfections, at present ignored on this side) to a point which will make them practical and preferable to our own. This point, I admit, has not been reached now, but it is admitted by all having knowledge of American motor matters that in the matter of quietude, American cars, both for commercial and pleasure purposes, have for many years contrasted most favorably with European designs. This is due to the fact that, from the first, America objected to noise. At a time when Europe was experimenting with the early Benz and Daimler cars, and was quite content to accept them as they were, America would have none of the "noisy, jumpy thing." Electricity was the power of the future, and she adopted it—only to find the vehicles too expensive to run. Steam followed, because of its quietude and simplicity, but in this the American designers of that period overdid the matter of simplicity and the cars were made too light and flimsy, with the result that, before they had had time to perfect their models, the European petrol car had asserted itself. When, therefore, the American designers, in their earlier petrol days, had to compete against steam and electric vehicles, a not unnatural result was that the noise of petrol cars of the period made sales impossible, and they simply had to quieten their constructions.

ENGINE UNDER DRIVER'S SEAT

Let us look, now, at the special mechanical features which characterize American commercial vehicles today. We find that they are not so far removed from common sense as might be imagined. In the first place, we have the engine "anywhere but under the bonnet"—as "E. A. M. T." put it. In this respect, however, the American designer is not by any means alone. With the exception of those pleasure-car firms who are endeavoring to cater for the commercial vehicle market in the lighter forms of car with adapted pleasure-car chassis, the principle of putting the engine under the driver's seat, or under the foot boards, is quite as common on this side of the Atlantic, both in this country and on the Continent, as is the more conventional pleasure-car design in which it is placed under a bonnet. The American manufacturer has more universally adopted this system than we have, it is true, but it is rapidly being recognized over here as correct, and most new firms entering the business are falling into line. It is a design which saves

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*This article appeared in a recent issue of *The Commercial Motor*, London. It is intended as a reply to a letter of a correspondent published in a previous issue of the same paper. This letter was filled with misstatements, and so obviously the work of a superficial observer that we attempted no reply to it ourselves. Mr. Sturmey, whose long connection with the motor industry entitles his opinions to an interested reading, is mistaken in supposing that the serious construction of gasoline commercial vehicles is of recent origin in this country. Serviceable gasoline work vehicles were in successful operation in the United States years ago, when the pleasure car was quite a crude construction. —THE EDITORS.

space on the road and in the garage, which avoids overhang of load, and which devotes the major portion of the chassis length within the wheel base to the conveyance of the load, instead of merely to the accommodation of driver, and engine.

AIR-COOLING

Next, as regards air-cooling. Here, we have an attempt to meet American conditions—conditions which do not obtain on our side. This may be considered as a point in design dictated by local circumstances, for the American manufacturer of to-day is of course, catering mainly for his home market. In the United States, and the Northern States in particular, the winters are very much more severe than they are with us, and for several months together the country is almost continuously under heavy frost. Hence, the water-cooling problem presents a difficulty which is entirely met by air-cooling, and further than this, too, air-cooling appeals to the American designer by reason of its greater simplicity and cheapness of manufacture; he has recognized from the first that, if not now, at any rate ultimately, price must be a ruling factor in commercial success, and by the adoption of air-cooling he saves both the cost and complication of radiators and pump.

PLANETARY AND FRICTION GEARS

The two-speed epicyclic gear is "not to be sneezed at." It is unconventional, it is true, so far as Europe is concerned, because epicyclic gear is but imperfectly understood with us. I have no hesitation, however, in saying that it is, in its two-speed form at any rate, absolutely the most satisfactory form of gear extant, considered as a gearing from the points of view of efficiency, simplicity and durability. A third speed on a touring car might possibly be desirable, but if a car is constructed with its power and gearing in relation to load, considered and proportioned with a view to its use as a two-speeded vehicle, it will do its work satisfactorily. We must not forget that in the commercial vehicle we are not considering whether the driver would "like" to have a 120-horsepower engine, 14 speeds, and a 100-mile an hour road speed, because the driver is only a part of our machinery of business. If the vehicle will do the work of our business satisfactorily, it is the driver's business to drive it.

The double opposed horizontal engine is, it is true, more popular than it is here, but it must be admitted that it lends itself extremely well to commercial design, because it can be so conveniently stowed away under the platform without intruding upon the effective load space of the vehicle.

THE FRICTION DRIVE

Friction drive is another point which is being experimented with seriously in the United States. There can be no doubt about its simplicity, nor about its flexibility, provided it can be made to work satisfactorily without absorbing too much power in the drive. The arrangement of two simple discs running against each other, varying their position of contact from center to periphery of the circle, gives a gradual gear variation which is decidedly attractive. Hitherto, but little experiment has been made in Europe with this form of drive, but engineers in America have devoted considerable attention to it, and by suitable choice of materials have succeeded in getting results which are unknown here. It is now largely used in factory equipment there. Rapid wear of the friction plates and a heavy absorption of power have been the causes which have largely prevented this principle from coming into favor with us, but the use of ball-thrust bearings has greatly minimized the power absorption and the selection of more suitable materials has reduced the wear. There are, I think, no two opinions but that, if it be proved that such a system of transmission can be made in such a way that it will not unduly absorb power, and that it will have a reasonable life, it possesses many and important advantages, especially to the commercial vehicle user, with whom both first cost and maintenance charges are important. It is, without a doubt, the cheapest transmission.

TWO-CYCLE MOTORS

The marvellous simplicity of the two-stroke three-port motor appeals to your American engineer: He is "out" to construct the simplest vehicle which will do the work, and he chooses the simplest form of engine available to his uses. It is true that we have largely "turned it down" on this side, at least for car work, though this is mainly due to its want of flexibility as generally constructed here. With a combination of a two-stroke motor and a friction drive, the American designer gets in the drive what he lacks in the motor, and at the same time gets the saving of a large number of parts. The two-stroke motor is quite successful with us as a boat motor, where wide ranges of engine speed are not required, and, although in touring cars it is not used by many makers in America, one firm at any rate—the Elmore—has made a success of it. We must not, therefore, judge the two-stroke motor, as used in America by the two-stroke motor as we know it here, and we can only admit that, all other things being equal, the two-stroke motor for commercial use would have no rival. The future of this construction depends on how nearly equal all those "other things" can be brought.

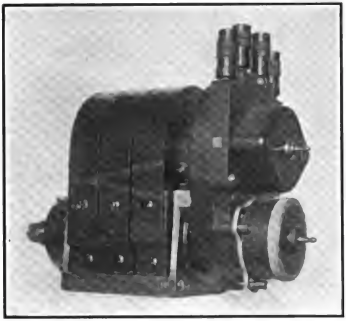
I am not one of those who consider the conventional Continental touring car design of to-day perfection. It is not. It falls short of perfection, mechanically considered, in many important particulars. In the pleasure car side of the business, British manufacturers have had their hands forced by their being late in the field, and by the free competition of foreign firms. But for this, I believe, we should have evolved a distinctly British type of car, which would have had superior mechanical features over the Continental models and which would have very materially assisted us in securing the Colonial markets. In so far as the commercial vehicle is concerned, however, the British manufacturer is easily first. While Continental makers were giving their entire attention to the touring car many in this country were seriously attacking the commercial vehicle problem, so that we are not as likely to be influenced by foreign designs so much, and we already have a more practical vehicle, which we have got largely by following the bent of our own inclinations, as American designers are doing to-day.

MOTOR COAL WAGONS, in which the box is lifted and dumped by the same motor that drives the vehicle, are being tried out in Berlin.

EISEMANN MAGNETOS FOR 1909

So apparent and real are the advantages of the magneto as a source of current for the ignition system of gas motor commercial vehicles that the employment of this apparatus has come to be almost universal practice. Its adoption is an insurance against delays, occasioned by run down or exhausted batteries, and at the other end of the scale it makes for far greater engine efficiency under the most favorable conditions of operation. One of the best known magnetos on the market is the Eisemann, which this year is constructed in two forms—with and without coil. The former is the newer type and possesses the advantages that it is self-contained and that the ignition wiring is very simple and short.

In the magneto without coil the low tension current produced by the primary winding of the armature is periodically interrupted by a revolving break, each break producing in the secondary winding of the armature a high tension current of very high voltage. An entirely new feature of this magneto is the special disposition of the pole pieces which are cut helicoidal shape. This feature has proven to be successful on account of the great smoothness and a larger range of advance. In fact, instead of the armature leaving the contact of the pole pieces and suddenly breaking the magnetic flux, by this new device the magnetic flux is progressively broken at one end and at the same time progressively re-established on the other side of the revolving armature, so that any demagnetizing is prevented. The armature is composed of sheets of soft iron insulated each one from the other by shellac, thus preventing eddy-currents in the inside of the soft iron pieces.



EISEMANN 1909 MAGNETO WITHOUT COIL

The high tension current is collected by a slip ring at the end of the magneto and carried to the distributing plate by an insulated lead and a carbon brush to the inside of the distributing arm. This distributing arm is fitted with a long rubber sleeve, so that the high tension current is insulated.

Regarding the advance, the point of breaking of the platinum point may be displaced on a range of about 35 by simply shifting the steel shoes on which the fibre block of the breaker lever is kicking. This range of advance is obtained without decreasing notably the intensity of the spark.

The armature is adjusted on ball bearings on the cam side and plain bearings on the driven end. Only special insulating materials of high grade are used. The distributing plate and the silk for insulating the armature are of special German manufacture and have been tested very thoroughly before using, so that this magneto, although not very original in its construction, presents a character of high efficiency due to the quality of the material employed in its construction.

The magneto with separate coil has electrical connections similar to those of the 1908 model. The make-and-break mechanism is fitted on a round plate, so that it can be detached quickly. The rubbing contacts are fiber on steel, the cam being made in steel and the lever of the platinum point being fitted with a fiber piece. This system has proved to be practically free from wear.

The high-tension distributor is fitted with an automatic cover and automatic arm. Steel brushes have been adopted as giving the best contact with the smallest rubbing on the copper segments. The armature is fitted with ball bearings on the cam side and plain bearings on the driven end. As the gears are now fitted on the front side of the magneto, it was necessary to fit some with ball bearings on the driving end on account of the room. A plain bearing is sufficient and gives a very satisfactory service. The armature, of course, is of the ordinary low-tension type.

SEAMLESS FUEL TANKS

Liability of fire due to leaking gasoline is greatly increased in motor trucks and delivery wagons because of the violent jolting to which these machines are subjected. Fuel tanks that easily withstand the service in pleasure cars and motor boats are apt to open up in the seams and allow the highly volatile and inflammable gasoline to leak out. A lighted match or open flame of any sort, or a cigar or cigarette may then start a blaze that will ignite a whole load of valuable goods. Such a catastrophe would be bad for the reputation of the makers of the vehicle and would doubtless prejudice the user against motor wagons in general. The fuel tanks made by Janney, Steinmetz & Co., of Philadelphia, are of pressed steel and are seamless. There are no brazed or riveted seams to open under any amount of pressure or vibration. They are made from heavy gauge steel drawn into shape while cold and tested to 300 pounds hydraulic pressure, so that all danger of leakage is eliminated. The tanks are thoroughly tinned inside and out with pure block tin, as it has been determined by observations during the last five or six years that although pure gasoline will not attack any metal, there is some foreign substance in the commercial gasoline that will positively attack zinc but will not attack tin. After going into the matter thoroughly, the Janney-Steinmetz people found that the cause of such action is the presence of acid in the liquid. This is in greater or less percentage at different times, as the gasoline that is supplied for motor vehicle use is not uniform in quality. Therefore, it is necessary that receptacles for this fuel be thoroughly protected by a heavy coating of tin to prevent deterioration. Tanks of similar construction are also made by this company for carrying compressed air and gas and for lubricating oil under air pressure. For storing gasoline and oil in the garage there are seamless steel barrels, which absolutely prevent the evaporation of the gasoline. Other Janney-Steinmetz specialties are underground fuel tanks with measuring pumps, and Flashlight spark plugs, for which great durability and positive ignition properties are claimed.

SOLID TIRES AND HIGH SPEED

Solid tires can be cured to such a carrying capacity that one cubic inch will carry 500 pounds without yielding ¼ inch, while they can be also cured so that a cubic inch of rubber will carry only 5 pounds to yield the same distance, writes J. A. Swinehart, of Akron, in *Scientific American*.

The writer's experience has proven that a solid tire not properly formed, that is, cured so hard that it will, on a rough pavement, bounce from one cobblestone to the other and will not keep down to the roadbed, is very little better than a steel tire; but on the other hand when the tire is molded in such a manner that one portion of it will always be compressed, so that when the wheel strikes an obstacle in the road (which has a tendency to raise the wheel off from the roadbed), this portion of rubber will pop down and keep in contact with the roadbed and prevent the wheel, which would be off the ground, from acquiring a very high speed while the car almost comes to a standstill, thus losing power and grinding off rubber unnecessarily when the wheel again comes down to the earth, will show entirely different results.

The writer had at one time designed tires that were placed on high-speed cars capable of running 50 miles per hour. The tires were smooth treads and cured rather hard. They were cured with a view of acquiring carrying capacity rather than comfortable or fast riding and it was impossible to make more than from 18 to 19 miles per hour on reasonably good pavements, as the tire was off the pavement nearly half the time, and when it would come down the tire had acquired such a speed that when the wheel struck the pavement it was as though an emery wheel would come in contact with a piece of chalk—the roadbed would grind the face of the tire down so that there soon would be nothing left on the rim.

Finding this unsatisfactory, we removed the tires and placed upon the same wheels tires with a center bead measuring about ½ inch high. This bead was compressed completely out of sight as the car stood on the pavement. While running the car, we found it a very easy matter to acquire a speed of 40 miles per hour over the same pavement on which it was impossible to get a speed of 20 miles per hour with the hard, smooth-face tire, and we would acquire this 40-mile speed with less fuel than was used with the hard tires when we were scarcely making 19 miles per hour.

After having made this experiment, and found that the speed to be acquired on solid tires depends upon the tires being softly cured and provided with a bead that would quickly adapt itself to the unevenness of the roadbed, we have decided that the art of successfully making use of solid tires will depend greatly upon the judgment exercised in shaping and curing the rubber and the proper application of the same to such loads as they are adapted to. All solid tires should be loaded, in order to acquire a rapid speed (without too much vibration) to nearly their full carrying capacity, with good buoyant springs between the axle and body of the car. Tires for electric cars used on pavements generally should have narrow treads.

MOTOR VACUUM CLEANER OUTFIT

The accompanying illustration shows the adaptation of a White steamer to a novel commercial purpose. The car is used by the Auto Renovator Co., of Cleveland, for the cleaning of residences and business buildings by the vacuum process. The chassis is that of a standard touring car on which is built a special body containing a dynamo and the several electrical regulating devices.

The car, carrying the necessary attendants and apparatus, is driven from its garage to the building to be cleaned. The dynamo is then belted to the driving shaft of the stationary car, and generates current which is conducted by means of wires into the room to be cleaned. Here the current operates an electric motor which drives the vacuum cleaning apparatus. This method has been found to be more convenient than the old system of having the vacuum apparatus carried in a vehicle with rubber piping running into the room to be cleaned.

As a means of attracting business, the car is fitted with a set of Gabriel horns, on which an operator plays popular melodies as the car is driven through the streets. The car has already become a familiar sight in Cleveland, and the owners report that it is booked several weeks ahead. The power plant of the White car is particularly well adapted for use where power must be supplied continuously for long periods when the car is not in motion, because the engine runs without noise, there is no unsightly exhaust, and there is no possibility of overheating.

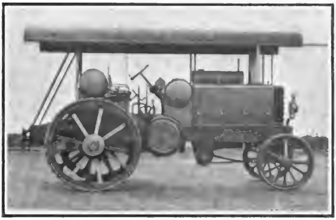
WHITE POWER PLANT FOR VACUUM CLEANING

Motor 'buses will be declared common carriers in Pennsylvania if bills introduced by Senator McConnell, of Northumberland, and Representative Perry, of Philadelphia, are passed by the Legislature. One section of the bills, which are identical, provides that such 'buses may run on streets parallel with street railway lines, provided they do not travel a greater distance thereon than 20 per cent. of the entire route of service.

DETAILS OF MILITARY TRACTOR CONSTRUCTION

Chief Characteristics of the Thornycroft and Broom & Wade Gas Motor Machines That Took Part in the War Department Trials at Aldershot—Trial Data

IN our April issue we published a general report of the military tractor trials conducted by the British War Department at Aldershot, and we now add some interesting particulars of the construction and performance of competing machines. As readers of the previous report will recall, there were three entries; two machines fitted with internal combustion engines and one steamer. As the latter is of a type which is practically non-existent in this country, we shall give more attention to the gas motor machines. One was a Thornycroft tractor of 50 horsepower, and the other was built by Broom & Wade, and was driven by a gas motor of 30 nominal horsepower. Both of these machines used kerosene oil as fuel. They are illustrated in the accompanying reproductions of photographs. In our April issue the steamer was illustrated.



THORNYCROFT TRACTOR IN ALDERSHOT TRIALS

THE THORNYCROFT TRACTOR

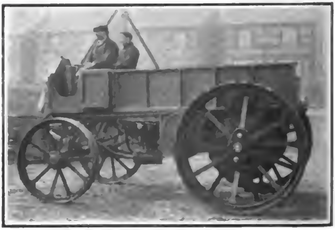
Of the three entries the Thornycroft is undoubtedly the most important. It is of a type previously evolved by this famous engineering concern for military service, though the former engines were of lower power. Its frame is composed of flat steel plates riveted together, and strengthened by cross members. At the front end the four-cylinder vertical motor is located, the cylinders being cast in pairs with ample water jackets, the bore being 6 inches and the stroke 7 inches, developing 50 horsepower at 850 r.p.m. All the valves are on one side. In order that the engine may run on kerosene it is provided with two float-chambers, one of which is connected with a small gasoline tank, and in the ordinary way the engine may be started up on gasoline. After running until the vaporizer is sufficiently warm, the gasoline supply is turned off and the engine fed with the heavier fuel. The vaporizer is simply formed by a single central tube through which the gas passes on its way to the inlet valves. Surrounding the central tube is another chamber through which the exhaust gases pass, keeping the supply tube hot. When it is desired to start the engine right away on kerosene the vaporizer is heated by means of a blow lamp. As to ignition, it is interesting to note that both high and low-tension magnetos are fitted, and are used simultaneously.

The remaining features of this tractor include a metal multiple disc clutch running in oil, a three-speed gear set giving speeds of 1 1-2, 4 1-4 and 7 miles an hour, and a gear drive to the near side road wheel. Steel road wheels are fitted, the rear being 5 feet 8 inches diameter and 12 inches wide, and the front 3 feet 6 inches diameter and 8 inches wide. Two separate fuel tanks are provided, being cylindrical in form, and having a capacity of 90 gallons. A small gasoline tank holding two gallons is provided for starting purposes.

BROOM & WADE MACHINE

The other internal combustion tractor differed widely from the Thornycroft, and comes from the works of Broom & Wade, of High Wycombe. In its leading features this machine is identical with the 4-ton truck built by the same company, practically all the parts affecting the success of the latter being interchangeable in the two vehicles, but the chain-driven differential instead of being in the main axle, as in the lorry, is in a second countershaft vertically over the main axle of the tractor. Gear rings inside each driving wheel mesh with pinions on the ends of the differential shaft.

As in the Broom & Wade truck, the engine has a single cylinder, 8 1-2 by 8 inches, developing 26 horsepower at 700 r.p.m. The fuel is ordinary kerosene, fed through the vaporized into the cylinder under partial vacuum, insuring perfect vaporization; the clutch is of the same cone disc type; the gear box has three gears of ratios 2, 3 and 7, in which the steel wheels and pinions are always in mesh and operate through dog clutches. An extra heavy Renold chain drives the differential, and the differential shafts like the driving axle are carried in Hyatt roller bearings supported in ball and socket pillow blocks.



BROOME AND WADE MILITARY TRACTOR

DETAILS OF CONTROL MECHANISM

The frame is built of steel channels, the engine and gear box being carried underneath a single plate in the middle. The steering gear is of the Ackermann type and identical with that used in the truck; consisting of a bell crank hung beneath the frame, of which the long vertical arm is linked to the axle arms, and the short arm is actuated by a screw in front of the driver. Underneath the driver's seat are the tanks for kerosene and gasoline (for starting purposes) and in front of it are the steering wheel, clutch pedal, brake pedal, change speed and reverse levers, levers for adjusting the throttle and spark, and screw adjustments for kerosene, gasoline and the water which is admitted into the cylinder with the air at the end of the stroke to prevent pre-ignition with the high compression that is used.

The frame is carried in springs. To allow the front axle to tilt on rough ground, the rear ends of the front springs are not linked to the frame, but support a transverse spring which supports the frame at its center and is free to tilt with the axle. One of the attachments of the axle to the springs is a swivel joint to allow of this action.

The mode of transmitting the tractive effort from the back axle to the frame differs from that used in the lorry because the axle is required to move vertically under the oscillation of the spring and not round the center of the chain pinion as in the lorry. Hence instead of the usual adjustable radius link connecting frame and axle bearing there is a vertical bar sliding in each bearing and stayed longitudinally and transversely to the frame restraining the axle from all motion except the vertical, which the depth of teeth in the road wheels permits of.

The road wheels are of steel and of the ordinary traction engine type, the rear wheels having diagonal strakes; both are free on the axle which revolves with them in the roller bearings. The gearing of the left-hand wheel is not attached to the wheel boss, but to a loose distance piece on the hub which drives the wheel through the usual locking pin. On this distance piece runs the winding drum, also driven from the gear ring by a removable locking pin, so that the rope can be paid out whether the tractor is moving or not.

There are three independent brakes fitted; the first for ordinary use is a band brake on the chain pinion shaft, actuated by a foot. The second, operated by a screw, is a band brake in the spider of the differential; the third is a block on the inside of the rim of the right-hand driving wheel, operated by a screw from the driver's seat.

To enable the differential to be locked so that one road wheel cannot slip without the other, one of the differential wheels carries three pawls which can drop into corresponding recesses in the spider. These pawls are kept in the "in or out" position while revolving, by a ring moved along the axle by a lever operated from the driver's seat.

Reserve kerosene and water tanks are carried at the back of the frame. The exhaust from the engine first enters a large expansion chamber and thence passes to a muffler beside the driver's seat and escapes by a vertical pipe above the awning. The radiator is mounted on the dashboard and perfect thermal circulation of cooling water is secured without the use of a pump.

GENERAL RESULTS OF TRIALS.

Weather conditions during the tests (which occupied several days) were very bad: at first heavy snow and later deep mud. The results of the first day's test, which was made on a level space at the military camp of Aldershot, are as follows:

No. 3 (Stewart).—33 laps around yard. Time, 2 hours. Lap, 291 yards; 2.72 miles per hour. Fuel (coal) consumed, 272 lbs. (including lighting up).

No. 4 (Thornycroft).—20 laps around yard. Time, 2 hours. Lap, 291 yards; 1.65 miles per hour. Fuel consumed, 3.75 gallons = 30.7 lbs. Gasoline, ½ pint = .45 lb.

No. 10 (Broom & Wade).—23 laps around yard. Time, 2 hours. Lap, 291 yards; 1.9 miles per hour. Fuel consumed, 4 gallons = 32.8 lbs. Gasoline, 6¼ pints = 5.6 lbs.

From an official point of view the trials were undoubtedly important, and were watched with interest by many whose business brings them in close touch with military transport from all over Europe. Of the competing trio the Stewart-Crosbie steamer was the first of the type turned out, and was at times delayed through mechanical difficulties which will without doubt be avoided in future models. The Broom & Wade was very much underpowered, though it made a plucky fight all through, while the Thornycroft was of considerable power, and the outcome of many years of experience, so that it simply waded through all obstacles and difficulties and easily won the only prize of $3.750, the War Office purchasing the machine, which was priced at $4.750, and adopting the type for all future work.

A REPORT upon the importation of motor vehicles of all classes into Australia has been made to Washington by Consul-General John P. Bray, of Sydney. He writes that according to customs returns 3.559 motor vehicles were imported from 1901 to 1907. Of this total 1,175 went to New South Wales, 1,436 to Victoria, 132 to Queensland, 496 to South Australia, 224 to Western Australia and 96 to Tasmania. The total import value of these vehicles was $3,392.125, and the duty paid on them amounted to $701,105. Of the total number of machines imported during the period mentioned 398 were from the United States. During the nine months ending September 30, 1908, there were imported chassis for pleasure cars, motor trucks and wagons of a total value of $933.394, the duty upon which amounted to $22,439.

THE COST OF RUNNING a motor truck which was adopted for delivery service by one of the largest wholesale grocery houses of Indianapolis, is given as follows for the year ending March 15 last: Storage, $300; gasoline and oil, $277.05; tires, $92.25; repairs, $39.05; battery charge, $7; total, $715.35. On a conservative estimate, this truck displaced two teams and drivers, so that the wages of one man were saved. These would amount to nearly the total cost of operation and maintenance, less the cost of one man's wages which do not appear in the foregoing figures.

FINDING HANDCARS TOO SLOW, the Chicago & Northwestern Railroad is about to place an order for sixty-eight gasoline motor cars of the same size as the present handcars. Owing to the saving in time that will be effected, the sections on the Galena division and its branch lines will be considerably extended and the number of foremen and section men reduced, greatly decreasing expenses. The new motor cars are expected to be in operation by spring.

MOTOR MAIL SERVICE IN NEW YORK CITY

ALTHOUGH motor mail wagons have been in successful use in Milwaukee for two years and in Detroit and Indianapolis for shorter periods, the first regular service to be established with them in New York City was started on April 15. Three electric vehicles fitted with bodies of the familiar wire screen type officially designated as panel M screen, were on that day put at work in the Washington Heights section under contract by the Motor Delivery Co. They make half-hourly trips with mail in sacks from College Station at One Hundred and Fortieth street, near Eighth avenue by way of Station M at Amsterdam avenue and One Hundred and Fifty-seventh street, to the Washington Bridge station on Amsterdam avenue near One Hundred and Eighty-first street. The distance is a little more than two miles, with one short but very steep grade to climb from Eighth avenue to Amsterdam avenue on the heights. A fourth wagon of the same type is kept in reserve to take the place of any machine that becomes temporarily disabled.

While the new service has been in operation only half a month, the superintendent of mails at the general postoffice does not hesitate to say that he considers it most porbable that it will be a success. He asserted to the COMMERCIAL VEHICLE representative his conviction, not from any inside knowledge that he has of pending developments, but simply as a matter of belief in intelligent progress, that practically all of the horse wagons now in the postoffice service will soon be superseded. "The postoffice," he said, "should be modern. Breweries use motor trucks to haul their beer, and mail is as important as beer, isn't it?"

The new motor-wagon service is not merely a temporary trial, but is being furnished under a regular messenger route form contract. Such contracts usually run to July 1, the end of the government fiscal year. All classes of mail are carried—first, second, third and fourth—and the wagons are usually well filled, although no record has been kept of the tonnage. Neither has the postoffice attempted to keep records of the running time of the vehicles to ascertain how much quicker the present system is than that formerly used. Heretofore the mail was carried on surface road cars running on Amsterdam avenue, so that as far as actual running time is concerned there is no great saving, but there is a saving in messenger service from the stations to the cars, as the motor wagons can run directly to the door of the three subpostal stations and men with hand carts can be dispensed with. Usually the motor wagons lie over for not exceeding ten minutes at each station. The wagons, drivers and all equipment in connection with the service are furnished by the contracting company.

It is intended shortly to extend the service to Station J at Eighth avenue and One Hundred and Twenty-fourth street, nearly two miles south, where connection can be made by underground pneumatic tube with the Grand Central Railroad station and the general postoffice at City Hall.

There has been some prospect recently of the adoption of motor mail service in part of Brooklyn. When the Government sought to renew the contract with the Brooklyn Rapid Transit Co. for the carrying of mail on the trains of the elevated railroad, the company demanded a very material increase in the present rate, to which the authorities were not disposed to agree. At this juncture a proposal was made to Postmaster Roberts, of the Brooklyn postoffice, and the officials of the Postoffice Department in Washington, where all contracts are made, by an enterprising motor car manufacturer, to haul the mail by motor wagons. While the offer was under consideration at Washington, where there was some doubt as to whether any appropriation existed by which such a change could be put into effect, the elevated railroad company changed its attitude, and the probability now is that the contract will be renewed on the present basis.

It is of no small interest to note, in this connection, the rate of 15 cents a car-mile charged the government by the Brooklyn Heights Railroad Co. for hauling mail on the surface car lines of the company, which last year amounted to a total of about $35,000. Local postoffice authorities are not at liberty to give out any information concerning such matters, but if these figures are correct they furnish a basis upon which commercial vehicle makers and owners could do some figuring.

Until the present contract was undertaken for the Washington Heights motor wagon service in Manhattan motor vehicles had not been tried in the New York postal service, the only approach to it being in 1905 during the strike of mail wagon drivers, when one of the contractors put on about eight automobiles of various types to carry the mail for one night.

BOSTON AND INDIANAPOLIS USE MACHINES

Experiments in mail delivery with a motor car are being made in the Newtons, comprising outlying sections of Boston, in which there are nine different districts covering a total area of 20 square miles. As the routes are scattered, the postmen who formerly collected and delivered the mail were greatly handicapped. Recently an Overland car was placed at the disposal of Postmaster Mansfield and a new system adopted. The carriers now collect the letters from the drop boxes and carry them to the nine different sub-stations, where they are called for by the motor car and hurried to the post office, from which they are to be carried away by the postman on his regular trips. Three daily trips are made by the machine, aggregating 110 miles, and now a special delivery letter mailed in the early afternoon will be delivered the same evening to the addressee.

Regarding the success of the motor service, Postmaster Mansfield says: "The automobile delivery has been given a severe test, for the roads have been in a deplorable condition since we established the system on January 1. But, in spite of the bad condition of the roads and a few unavoidable breakdowns, I consider this method of delivery a decided improvement over the old one."

The accompanying illustration shows two Overland mail wagons, which have been giving very efficient service in Indianapolis. The machines have been leased to the United States Postal Department by the builders, who

OVERLAND MAIL MOTOR WAGONS OUTSIDE THE FEDERAL BUILDING IN INDIANAPOLIS

supply the drivers and are responsible for the upkeep. It will be noticed that the driver has no access to the interior of the wagon; the front seat is divided in such a manner that the postal official rides "backwards" so that he has the contents of the wagon under his observation when running. The machines were designed by Will H. Brown, vice-president of the company. They are painted red, white and blue, and upholstered in bright red leather. The bodies are enclosed with heavy wire netting and drop curtains for stormy weather. They are used chiefly for decentralizing the mail, greatly facilitating the distribution of letters as the carriers do not need to return to the general postoffice for the various deliveries. Postmasters of other cities are much interested.

HORSE-POWER FORMULA ADOPTED BY THE A.L.A.M.

HOWARD E. COFFIN Chairman Committee on Tests

THE relation of long or short stroke in the actual determination of the horsepower which will be delivered on the brake by an engine has no more influence than have a half dozen other features or variations of engine design.

The development during the past year abroad of some motors of a fixed bore but of an abnormal and commercially impracticable stroke, has had a great deal to do with the current discussion of the Association Licensed Automobile Manufacturers horsepower formula. This formula, $\frac{D^2 \times N}{2.5}$, wherein D is the diameter of the cylinder, N the number of cylinders and 2.5 a constant, adopted as a result of a long series of experiments by the members of the Association of Licensed Automobile Manufacturers, upon motors of various types and conditions, does not, it is true, take cognizance of the length of stroke *per se*. It is also true that some more or less complicated formula can be developed that will take into account the length of stroke. In fact, there have been so many of these formulæ proposed and discussed upon both sides of the water, that as is usually the case where too many cooks get a spoon in the broth, it would seem impossible to settle upon any formula that could give universal satisfaction. It is very questionable, also, whether any such revised formula would be any more accurate in the end, even though it did take the matter of stroke into account.

Matters of compression, of the design of the combustion space, of the weight of the reciprocating parts, of the size of valves, and of perhaps a half-dozen other considerations, might and do go to influence the brake horsepower delivered by a motor, fully as much as, or more than the length of stroke, within the range of successful commercial construction.

About the same discussion upon this same A. L. A. M. formula has been going on for a considerable time past in England, where the formula was originally developed and adopted by the Royal Automobile Club. The formula has for its intent a simple, fair and uniform rating of gas engines of the usual type and within the limits of construction which have come to be recognized in the motor car industry as commercially satisfactory.

There will always be freaks, both up and down the scale, to which the results obtained from this formula may not be applied. This same condition would hold with any formula that might be invented and, in fact, it becomes very much of a question whether or not greater variations would not be introduced in any formula in which were combined any of the many other influences that enter into the actual power delivered by a motor. Even though a manufacturer may guarantee a horsepower from 20 to 30 per cent. greater than that indicated by the formula and at the piston speed which is much higher than that contemplated by the formula (namely, 1,000 feet of piston speed per minute), yet the fact remains that this same motor when reduced to the common basis of 1,000 feet of piston speed per minute, will very probably not be so far away from the result given by the formula, as might at first appear.

In any event, it may be pretty generally assumed that any other motor of the same or different diameter of cylinder, when placed upon the same basis of 1,000 feet of piston speed per minute, will bear a power relation to the first motor entirely in accordance with the formula.

This A. L. A. M. horsepower formula is a safe one for the buyer, in that he may always figure it as the low side of the actual power of a good motor. The fact that a speeding up of the motor so that the travel of the pistons over the surface of the cylinder walls will be much greater than 1,000 feet per minute, will enable the manufacturer to produce and guarantee a horsepower greatly in excess of that indicated by the formula, has no bearing whatever upon the very definite and very practical uses of this formula as a basis of comparison of the performances of gasoline engines.

A simple, concise and definite formula is of the greatest importance at the present time in matters pertaining to State legislation governing the use of motor vehicles upon the public highways and is the only proper basis for the taxation laws which are being enacted in various sections of the country. We understand that this formula has already been so adopted in several of the States where such laws have been made.

DOWAGIAC LIGHT DELIVERY WAGON

A gas motor delivery wagon of 1,500 pounds load capacity marketed by the Dowagiac Motor Car Company, of Dowagiac, Mich., is shown in the accompanying engraving. It meets the requirements of a light vehicle, occupying comparatively little space, and easy to handle. The open body is 6 feet 3 inches long, back of the driver's seat, and is 3 feet 6 inches wide. The wheel base is 100 inches and tread 56 inches. All wheels are 36 inches in diameter and are shod with 2½-inch solid, endless, side-wire, rubber tires. Heavy angle steel is used for the main frame and from this the body can be detached easily by the removal of three bolts.

The power plant includes a double opposed gas motor, with cylinders 5½ inch by 4½ inch, rated at 24 horsepower, and planetary change-speed gearset, giving high and low speeds forward and reverse. This is chain geared to the cross countershaft, on the outboard ends of which are the sprockets for the side chains which drive the rear wheels. The fuel tank has a capacity of 12 gallons of gasoline, which is fed to the motor through a Schebler carbureter. Water cooling is employed for the motor on the thermo syphon system, dispensing with a water pump. Jump spark ignition with double coil and mechanical lubrication are provided.

DOWAGIAC LIGHT GAS MOTOR WAGON

The driver's control is simple; including spark and throttle levers on the steering wheel, high speed operated by side lever and low speed and reverse by foot pedals. The brakes, which are fitted to the rear wheels, are also operated by pedal. Equipment includes two side oil lamps, tail oil lamp and full set of tools. The name of the machine—familiar to all fresh water fishermen—is pronounced, "doe-wah-jack."

ICE DELIVERY BY MACHINE

The accompanying illustration showing a Packard ice wagon, with a capacity of three tons, in service in San Francisco, directs attention to the special advantages of the motor-driven over the horse-drawn vehicle for this particular work. The largest consumption of ice is, of course, in the hottest weather when the loss due to melting is at its maximum and when, at the same time, the efficiency of the work horse is at a minimum. The rapidity with which deliveries over any given route can be made by the motor vehicle is a very important consideration, giving the least possible delay between the storehouse or refrigerating plant of the ice dealer and the ice box of the consumer. Then, too, the efficiency of the motor is practically unaffected by high atmospheric temperatures, and as heavy loads can be carried in midsummer as in the depth of winter. And as ice has considerable bulk in proportion to its value the cost of transportation from the dealer to the user is a very considerable item in the ultimate selling price. It would be possible also to use the power of the motor to operate an ice-crushing or shaving apparatus so that this work could be quickly performed and the delays occasioned by the present hand methods materially shortened. Unquestionably the development of the motor vehicle in ice delivery service will be very large.

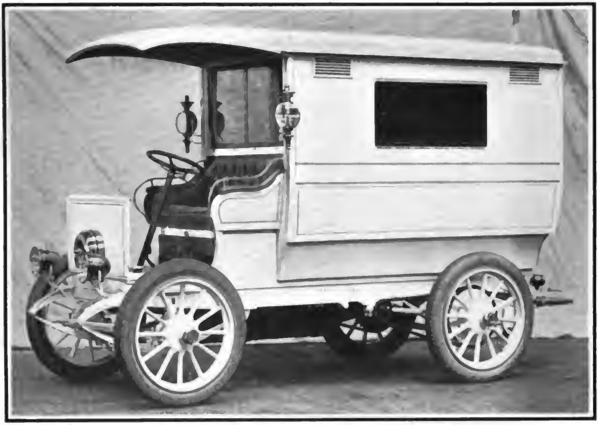
PACKARD TRUCK WITH ICE-CARRYING BODY

BAKER ELECTRIC AMBULANCE

The ambulance shown in the accompanying photograph was recently built by the Baker Motor Vehicle Co., of Cleveland, and shipped to Oakland, Cal., for use in connection with a hospital there. The machine is interesting in a number of particulars. For instance, the pressed steel frame and the body are very low hung, both front and rear axles being dropped below the centers of the wheel hubs and the springs hung beneath the axles instead of resting on top of them. This makes it easy to lift patients into and out of the body. The steering wheel and controller handle, which are on the steering column, are placed on the left side, making access to the front seat an easy matter for anyone riding with the driver. The chassis has a wheelbase of 92 inches and wheels of 34 inches diameter fitted with 4-inch Palmer web clincher tires.

A single series-wound motor, rated at 3 1-2 horsepower but capable of 300 per cent. overload for a short time, drives the machine by a Renold silent chain from the motor to the countershaft. The countershaft has a new quick-detachable suspension with four bearings. Motor and countershaft run on imported anti-friction ball bearings, while Timken roller bearings are used in the front and rear wheels. Both axles are drop forged.

The batteries are carried in a quick detachable cradle underneath the body forward of the motor. They consist of 42 cells of 9 MV plates each, operated in series at all speeds. Complete with batteries, the chassis weighs 3,000 pounds.



BAKER ELECTRIC AMBULANCE BUILT FOR HOSPITAL SERVICE IN OAKLAND, CALIFORNIA

The body is painted white, striped with gold, and is fitted with a large gong on the dash. There is a large window in each side as well as in front and in the rear doors. Near each of the upper four corners are ventilators in front, sides and rear, making eight in all. The side windows are made to slide sidewise, while that in front can be dropped down behind the driver's seat. The interior is finished in white, with red pantasote upholstering. Inside dimensions are: Length, 86 inches; width, 43 1-2 inches; height, 65 inches. A hinged cot 26 inches wide and 85 1-2 inches long, is placed at a height of 16 1-4 inches from the floor and is made adjustable for reclining. The lining is removable for cleaning. In the base beneath the cot are three drawers for medicines and surgical instruments.

RIVERSIDE 'BUSES STOPPED

With the aid of the police, Park Commissioner Henry Smith, of New York City, has forced the New York Transportation Co. to discontinue its new double-decked omnibus service on Riverside Drive from Seventy-second street to Grant's Tomb pending decision of a test case of the Park Commission against the company now in the courts.

On Easter Sunday when the company attempted to start the new service on this extension of its route by operating the new 'buses on a six-minute headway, the bicycle police began arresting the drivers of the vehicles. 'Buses filled with passengers were taken over, singly and in pairs, beginning at 4 P. M., to the One Hundredth street police station between Columbus and Amsterdam avenues, until at one time there were seven of the big vehicles waiting in line. In all, ten drivers were arrested. As soon as the first arrest was made officers of the company started for the police station, and upon arrival bailed out four of the drivers. The others were taken to the Night Court, where the cases were continued and they were paroled in the custody of counsel for the company.

Further attempts to run the 'buses on the drive were discontinued and on April 15 the following notice was posted on the windows of all the company's 'buses operating on Fifth avenue from Washington square to Seventy-second street and Riverside Drive:

TO THE PUBLIC.

The Park Board has forbidden us to run these stages on Riverside Drive, alleging that they damage the trees. Although it will be an inconvenience to the public as well as contrary to our own rights and interests, we are forced to announce the suspension of regular operation of these stages upon that portion of our route until further notice.

The Commercial Vehicle

Vol. IV May, 1909 No. 5

Published Monthly by The Commercial Vehicle, Incorporated, at
1402 Broadway, New York City

Cable Address
Comveh, New York

Long Distance Telephone,
425 38th Street, New York

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Chicago, Ill.

Subscription Rates

United States, Canada and Mexico . . . . One Year $2.00
Other Countries in Postal Union . . . . One Year $3.00

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Entered as second-class matter, September 13, 1906, at the post office, New York, N. Y., under the Act of Congress of March 3, 1879.

TAXIMETER INSPECTION DEMANDED

So many complaints of irregularity in charges indicated by the registering meters fitted to motor cabs have been made since the introduction of taxicabs in New York City that the Board of Aldermen was forced to take cognizance of the matter. Two ordinances were introduced in that body last January having for their object the official inspection by the city of all taximeter instruments in use. In his annual message Mayor McClellan, recommending action on the subject, said:

> I respectfully suggest to your honorable body the adoption of an ordinance requiring taximeters to be tested by the city. Within a year it has become evident that the taximeter, with its supposedly exact measurement of distance and time, is a popular appendix of public vehicles. It is, however, as subject to error as any other mechanical device and should be inspected as are weights and measures. A system of test is used in some European cities and it seems time that New York adopted means to protect users of cabs from overcharge through design or accident.

One of the ordinances, introduced by Alderman Dowling, was reported favorably by the Aldermanic Committee on Laws and Legislation after a public hearing on January 25, and was referred to the chief of the License Bureau with a request for a report on the different phases of the measure before final action was taken. In presenting the report of his committee, the chairman remarked:

> If taxicab rates are to be passed upon by the board, the proposed ordinance will pave the way for a readjustment of charges; but what is most important now is that all taxicab meters be inspected and regulated under official supervision. It is the desire of the committee that there shall be a simple meter—one that bears no complicated figures on its face, and one which can be easily read. We want an ordinance that will be effective—one that will prevent overcharges and compel restitution where overcharges can be traced. In the matter of adjusting the taxicab meter connection to the front instead of the rear wheel, the advisability of establishing an independent bureau of inspection and supervision and other aspects of the situation must be fully considered.

The second ordinance was introduced on the same day as Alderman Dowling's, by Alderman Brown, and was also referred to committee. By its provisions the inspection and testing of taximeters is placed with the Bureau of Weights and Measures by an amendment of Chapter VIII of the Code of Ordinances of the City of New York, by the addition of the words "taximeters of mileage registers" to the names of various weights and measures for which inspection is provided therein.

On April 14 there was a public hearing upon the proposed ordinances before the aldermanic committee in New York. This was largely attended by interested persons, including citizens with complaints about overcharges, and makers of various fare-registering instruments. No opposition to the proposed measures developed, however, and favorable action is likely to be taken by the City Council at an early date.

There can be little doubt that the subject of the accuracy of taximeters needs official investigation and regulation, for innumerable stories are told by users of the variations in charges, often for trips over the same route and in vehicles belonging to the same company, while many letters of complaint by patrons have been published in the daily papers. Chauffeurs are accused in some cases of manipulating the meters to run up the mileage in order to get a larger return through their 20 per cent. proportion of the total takings of the cab for the day, but it is much more likely that any intentional manipulation by a driver occurs in the case of a cab that is owned by the driver himself or hired by him to be run independently. There are many public cabs in New York owned and operated by men who have formerly worked as private chauffeurs or as drivers for the large taxicab companies. No responsibility attaches to these operators, and while they presumably operate under the same tariff as the larger companies, it is possible for them to arrange the meters so that they will register an excess mileage.

In London the police department now requires that all taximeters shall be connected with the front wheels and that furthermore the face of the instrument must be illuminated at night by a little lamp so that the passenger can read the figures without difficulty. All of the taximeters used on the cabs of London are required to pass a series of tests for accuracy at the physical laboratory at Kew, where a number of instruments are set up at the same time on a bench and started running just as if attached to a vehicle. They must undergo this test every year, and any new type of instrument brought out must be taken apart and examined and then tested on a vehicle as well as on the bench before it can be approved.

In Washington Major Sylvester, chief of police, has recommended that a regulation be passed requiring the taxicab companies to furnish proof of the accuracy of their instruments and providing for periodical tests of the meters at the expense of the companies and a fine of not more than $40 when it is proved that an inaccurate meter is in use.

A somewhat similar ordinance, which also fixes the legal rate of cab fare, is pending before the Chicago City Council, as reported elsewhere in this issue, and the authorities in Boston are also taking up the subject.

A DISGRUNTLED USER

The operating methods of a New York motor truck user, who has done much to discourage others from purchasing vehicles of various types, were investigated during the past month with interesting results. While the concern in question keeps no very accurate cost account, they "have enough," as they say, "to tell if the machine is an economic method of delivery." In the investigation, one of the first items of expense encountered was a charge of $175 each month, "cost of current" for charging the battery of one five-ton truck. No one could explain how such a figure was arrived at, and no itemized entries on the books were found to correspond to it. The item of repairs and replacements footed up to about $150 a month—the actual work being performed by the driver—and yet the total amount of parts billed by the truck maker's factory in fourteen months was $240. A representative of the COMMERCIAL VEHICLE was informed at the time of his last call, that the machine was to be laid up and that before it would be placed in service again, an entire new set of tires would be necessary; careful inspection developed that the tires were good for at least 2,500 miles and did not even require resetting.

One day an "expert" electrician who happened to be passing the garage of this concern informed the driver that he should always discharge the battery if he did not have occasion to use the truck for a day or two; so thereafter, on Saturday nights and other days when the truck was not to be taken out the following day, the driver would jack up the wheels and allow them to run till all the "juice" was exhausted.

This condition of affairs seems hardly credible and yet it is not a solitary case by any means, as those who have occasion to keep in touch with the management of delivery systems of business houses know only too well. The motor truck salesman is often confronted by "information" concerning machines given out by equally well informed (?) users, which frequently makes sales impossible.

AMENDED MOTOR VEHICLE LAW

By agreement between the New York legislators and representatives of motor vehicle associations and interests an amendment to the State Highway Law has been prepared and reported to the Senate at Albany as the All's Bill. This has for its purpose the regulation of the registration and use of motor vehicles by the State. It is very probable that it will soon become the law, and no doubt will serve as a model for more reasonable legislation in other States. The bill provides for the abolition of all specific restrictions as to the speed of motor vehicles on the highways, the controlling clause reading as follows: "Every person operating a motor vehicle on the public highways of this State shall drive the same in a careful and prudent manner and any rate of speed so as not to endanger the property of another or the life or limb of any person." Thus the responsibility for the speed of any machine at any given time or place is laid squarely upon the driver, and no doubt he will be held strictly to account by the courts which have to enforce the law.

The framers of the bill have wisely discriminated between commercial vehicles and those used for pleasure purposes, in regulating their registration and taxation. Thus, while the registration fee for pleasure cars varies from $4 to $10, according to the horse power of the motor, all vehicles which are to be used solely for commercial purposes are to be registered for a fee of only $2. Makers of motor vehicles and dealers within the State can procure duplicate certificates of registration, for all vehicles they may operate in the regular course of business, upon payment of a registration fee of $15. All registrations are to be renewed annually upon the payment of the proper fee, the renewals taking effect on the first day of January each year.

Non-residents of the State who have complied with the requirements of the motor vehicle laws in their own States are permitted to operate their machines in New York without payment of any registration fee, except in the case of non-resident corporations doing business in New York State. Drivers of pleasure cars are required to pay a registration fee of $10 for license to operate, while in the case of vehicles used solely for commercial purposes the registration fee is only $2.

A very important provision of the proposed law makes it a misdemeanor for any person "using, operating, driving, injuring, or tampering with a motor vehicle without the permission of the owner," punishable by a fine not exceeding $100 or imprisonment of not more than six months. The suspension of the right to operate a motor vehicle is also within the discretion of the court.

Motor bicycles, motor cycles, traction engines, road rollers, fire wagons and engines, police patrol wagons and ambulances are exempted from the provisions of the law.

* * *

A vigorous effort made by the manufacturers of motor vehicles in the United States to have the present tariff of 45 per centum ad valorem on all complete machines and their parts, imported into this country, remain unchanged in the new tariff bill, now under consideration in Congress, has apparently been successful. Under the operating conditions which exist in this country it is not likely that any extensive importations of foreign-built motor trucks and wagons would follow a reduction in the tariff rate. Nevertheless the maintenance of that rate has a steadying effect on trade conditions, and manufacturers are in a position to go forward on the lines they have already laid down, without apprehension of the competition of the cheaper labor in Europe. It is in the field of the taxicab that most competition would likely result from any modification of the present duties, for the reason that the sudden demand for machines of this type is in excess of the capacity of the home shops. Foreign builders have already largely supplied their own home demands and would likely be glad of an opportunity to dispose of surplus stocks at their own prices in the United States.

A recent statistical report on the motor vehicles in service in Germany shows that at the close of last year there were 41,727 machines of all types. Of these, 39,475 were for passenger transport and 2,252 for industrial purposes. Of the former, 20,928 were motor-bicycles. An increase of 5,705 motor cars against the previous year is reported.

DETROIT'S ATTITUDE TOWARD THE MOTOR TRUCK

LEN G. SHAW

THE reason why commercial vehicles have not hitherto been able to secure a strong footing in Detroit depends largely upon who answers your inquiry. The manufacturer may deplore the situation at great length, or he may dismiss the subject with an impressive wave of the hand, but in either event he will fall back on the threadbare statement that a prophet is not without honor save in his own country.

ELECTRIC BREWERY TRUCK IN DETROIT

The man who sells commercial vehicles will inform you, with a suggestive shrug of the shoulders, that it is the makers' fault.

The merchant approached on the subject merely crosses his fingers and smiles, indicating that he is a member in good standing of the Showme Fraternity.

Like the blind men and the elephant of old, all are partly in the right, and all are in the wrong.

Paradoxical as such a statement may seem, nature and municipal activity have been two of the most serious hindrances with which the power wagon has had to contend in Detroit.

A SCARCITY OF HILLS.

With the exception of a single block there is not a spot in the city worthy of being dignified by the term "hill." The city lies almost flat, and it is necessary to get some miles out into the country before rolling ground is encountered. This makes conditions ideal for the motor wagon, which can be operated with maximum results at a minimum cost. At first thought this might be regarded as a strong talking point; but it isn't, for the reason that these same conditions operate just as advantageously for the horse drawn vehicle, which can carry almost any sort of a load with ease, while the absence of hills providing the tough pulling where the motor wagon proves invaluable eliminates the last point in favor of the latter.

Municipal activity has likewise proved a handicap through providing pavements that have simplified the problem of trucking and strengthened the position of the horse.

There is still another factor which those familiar with the early history of the commercial vehicle seldom mention and which they are striving hard to forget.

Detroit is the recognized home of the automobile industry, just as it was among the pioneers in the commercial vehicle field. It was one of the first to give the latter a trial, and that trial came near proving their undoing, so far as this city was concerned. Like the automobile of the early days, the commercial vehicle was much of an experiment. It looked good—and often acted bad. And therein lies one of the chief reasons why it failed to make a profound hit locally, a reason that, happily, has long since disappeared.

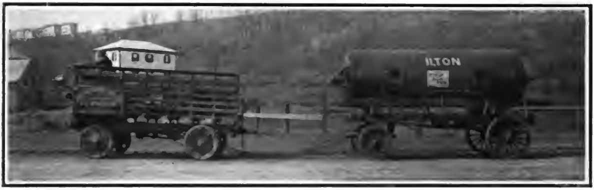
Among the first to adopt motor vehicles in Detroit was the large retail grocery house of Peter Smith's Sons, a fleet of delivery wagons being installed. It was fleet in name only, being stationary much of the time. Whether the wagons were too light for the purpose, whether overloaded or overdriven, whether it was the fault of builder or owner, is still a mooted question. The fact remains that within a few months all were sold by the grocery firm for a song, horse-drawn wagons were once more put in commission, and the commercial vehicle had been given a black eye it was a long time recovering from.

A SUCCESSFUL USER.

By one of those strange freaks of fate, J. Henry Ling, a local piano dealer, installed a light delivery truck of the same make at about the some time, and it is still running daily. Mr. Ling had a large trade throughout the country surrounding Detroit, competing with dealers in nearby towns. He could make the sales, but deliveries proved both costly and slow. To send a piano twenty or twenty-five miles by team was out of the question. Shipping it by freight was costly, likewise slow. Loading a couple of pianos on the motor truck, the driver could start out in the morning, make the deliveries at distant points, and return the same night. The plan proved a success from the outset, and to-day Mr. Ling swears by the truck his grocer friends but a few doors away swore at. His machine has been subjected to the most trying tests and it has made good.

GAS MOTOR DELIVERY WAGON IN DETROIT

The Detroit Omnibus Line Company was another local concern to install motor trucks some years ago, and the original machines are still doing business daily through



MORGAN 5-TON 40-HORSEPOWER MOTOR TRUCK HITCHED TO A HEAVILY LOADED TRAILER

all kinds of weather, when the horse-drawn trucks of the same company have difficulty in getting about. They are used chiefly on long hauls and have proved dividend earners from the outset.

Other cases in plenty might be cited where the motor vehicle has demonstrated its efficiency.

The Vinton Company, contractors and builders, introduced a truck with which to answer hurry calls for material and supplies, and found it indispensable.

The Commercial Milling Company employed a truck in delivering flour to customers in the outlying districts, and although at the outset it was condemned it is now regarded a most valuable asset.

For a long time, in spite of this showing, motor trucks failed to gain in popular favor, and the campaign in their behalf was carried on in an indifferent manner.

MERCHANTS WAKING UP.

Then came the awakening, partly by merchants and partly by makers. The possibilities in this direction began to be appreciated. Those whose business involved heavy hauling or long trips began to realize that under proper conditions the commercial vehicle was the ideal medium of transportation, and makers of motor wagons awoke to the fact that it was up to them to provide those conditions.

To-day there are close to one hundred commercial vehicles of various kinds in commission, where two years ago there were not more than one-quarter as many. This does not take into account regular automobile chassis with specially built bodies, of which there are probably as many more. The ranks of the commercial vehicle hosts are receiving frequent accessions. The Packard Motor Car Company has demonstrated beyond a doubt what its machines are capable of accomplishing. The Grabowsky Power Wagon Company has enlivened the situation with an offer that embraces maintenance on a more comprehensive scale than ever before attempted locally. The Rapid, the Reliance, the Seitz, and in lighter lines the Cadillac, Cartercar, Brush runabout and others, all figure prominently, with outside concerns having a steadily increasing representation.

The principal users of motor trucks in Detroit are Peter Smith's Sons, grocers; Acme White Lead & Color Works, Gregg Hardware Company, H. C. Weber Hardware Company, Solvay Process Company, Vinton Company, contractors; Wm. Wright Company, decorators; Art Stove Company, Hammond, Standish & Company, meat packers; Albert Albrecht Company, general contractors; J. Henry Ling, pianos; Stroh Brewing Company, Detroit Omnibus Line Company and others.

Detroit has taken its time in warming up to the commercial vehicle, but it is making up for lost time just now and future prospects for the horseless wagon are indeed bright.

TRUCK USED AS TRACTOR

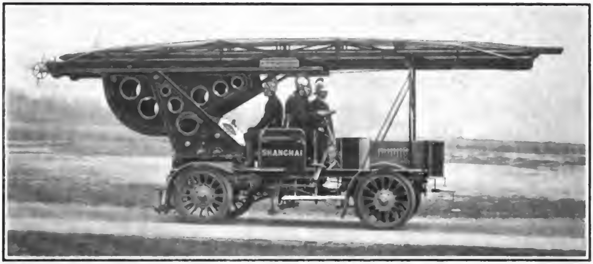
An interesting demonstration of the capabilities of a motor truck is shown in a circular that is being issued by R. L. Morgan, of Worcester, Mass. This shows a reproduction from a photograph of one of Mr. Morgan's 40-horsepower, 5-ton trucks, hauling an 11-ton steam boiler mounted on a 3-ton wagon. The boiler, which was too large to be loaded on the truck itself, was hauled more than five miles. In order to give sufficient traction to the drive wheels, a load of 4 1-2 tons of castings was placed on the truck. The combined load including the 3-ton trailer was 18 1-2 tons, which was successfully drawn, despite the fact that rain the day before had softened the roads and the 4-inch tires on the trailer cut in deeply.

A MOTOR VEHICLE TRANSPORTATION COMPANY has been organized in Tokyo, Japan, for the purpose of carrying freight and passengers throughout that city. The intention is to start the business with twenty machines to be imported from France. Five machines have already been delivered, two to carry passengers and the others freight vehicles of 1½ tons capacity each. It is reported that the French builders are interested in the project. A number of light commercial vehicles are already in service in Tokyo.

FERNAND RENAULT, a member of the famous French automobile manufacturing concern Renault Frères, died at his home in Paris in March. Only one of the three brothers who started the business is now alive—Louis Renault—who is the engineering chief. Fernand Renault attended to the business end of the concern. The other brother, Marcel, was killed in an accident in the Paris-Madrid road race in 1904.

PITTSBURG PAPERS have been commenting on the hauling of hay by motor wagon, around the stable section in the East Twenties, as a step toward the emancipation of the horse.

A FRENCH AUTOMOBILE COMPANY offers a coach carrying 12 persons and baggage for the use of theatrical troupes.



FIRE APPARATUS FOR CHINA WITH GAS MOTOR FOR PROPULSION AND LADDER RAISING

MOTOR DRIVEN "FIRE ESCAPE" FOR SHANGHAI

IN our issue of November last we published an illustrated description of an American motor-driven aerial ladder for fire service, built by the Seagrave Company, of Columbus, Ohio. Now, through the assistance of our London correspondent, we are able to publish a like description of an English machine for similar service, built by the famous makers of fire apparatus, Merryweather & Sons, of London, for the Shanghai, China, fire department. Machines of this type are styled in England "fire escapes."

The Shanghai machine is motor propelled to the scene of the fire and there the turntable is also operated by the motor. This "fire escape" is said to be the first in which the motor has been employed to raise and extend the ladder as well as to propel the machine. The gasoline motor has four vertical cylinders and is rated at 40-horsepower. The transmission system contains a change speed gearset which gives three speeds forward and reverse. On the road a maximum speed of 25 miles an hour can be easily maintained on the level and grades of 1 in 5 can be negotiated. The wheels are of the artillery pattern and are fitted with solid rubber tires, those in rear being of twin section. The ladders are four in number and extend to a total height of 80 feet. In the travelling position they rest horizontally on the carriage, but on reaching the scene of operations the power of the propelling motor can be transferred to the escape machinery through a vertical worm fixed on the center line of the turntable, and the raising and extending of the ladders to their full extent is effected in less than a minute. These operations can be carried out entirely by one man through two levers arranged side by side at the rear of the machine. The raising and extending of the ladders can also be performed by hand mechanism, alternative gearing being provided for this purpose.

The turntable is arranged for slewing the ladders round by hand to either side of the carriage and can be operated equally well in any position. Plumbing gear is fitted, enabling the ladders to be tilted sideways on the ladder framing, an advantage which can be appreciated when the carriage is standing on a hillside or other uneven ground. The sides of the ladders are fitted with Merryweathers' patent bow string girder truss of light steel tube, which, besides materially strengthening the ladders, forms a convenient hand rail, which is a great advantage when the height of the escape is taken into consideration.

Special attention has been paid to stability, and it may be mentioned that the escape can be extended horizontally to a distance of 50 feet at right angles to the carriage, and will then safely support two men on the extreme end without fear of tilting the carriage. The rear portion of the frame is fitted with two cross members carrying screw struts at their ends, which can be screwed hard on to the ground, so as to take the weight of the machine off the carriage springs and afford a solid base for the escape when in use.

Before being dispatched abroad, the machine was taken through the heart of London, in order to demonstrate its capacity for negotiating narrow streets, both for traveling and bringing the ladders into operation. It was driven along such thoroughfares as Laurence Poultney Hill, Watling Street, Paternoster Row, Ivy Lane and Philip Lane, and was eventually put to work in Bow Lane. This is perhaps the narrowest and most confined of the city streets, but the manoeuvering of the escape presented no difficulty, the combined movements of raising, extending and slewing on the turntable enabling any point within range of the ladders to be reached with ease.

Shanghai deserves every credit for its up-to-date policy in regard to fire brigade material, the machine under notice being the third motor fire appliance put into service at this important Chinese port. The first, a combined ladder and chemical engine, has been in service upwards of two years, and the second, a powerful motor steam fire engine of 800 gallons capacity per minute, was supplied early this year. These two machines were also constructed by Messrs. Merryweather, and the repeat orders prove that satisfaction is being given.

OF INTEREST TO VEHICLE BUILDER AND BUYER

Attention has been called by our London correspondent to an error in the short article on page 80 of the March issue of this paper, entitled "London Cab Owner's Experiences." The final sentence should have read, "Soon after Driver Brown got on the road with his new taxi he was chartered by a titled lady for a fortnight for $150 for the period," not 150 pounds Sterling.

The Abendroth & Root Mfg. Co., of Newburgh, New York, has made ararngements to push the sale of its motor trucks in addition to the line of pleasure cars which are sold under the trade name of "Frontenac." This company has a reputation of forty years' standing in the construction of machinery and engineering apparatus, and is known throughout the country as a very responsible concern. The output of the factory has been placed in the hands of Mr. J. J. Evans, who was identified with the Daimler Manufacturing Company when it built the American Mercedes cars on Long Island. Mr. Evans has headquarters and salesroom at 1621 Broadway, New York, at which already there has been considerable inquiry from merchants and other truck users concerning the new machines.

The Rapid Motor Vehicle Company has supplied four cars to a Pittsburg corporation to be used in the transportation of passengers from the foot of the plain on the south side to the heart of the city at Fifth and Liberty Streets. Machines have a seating capacity of 22 passengers and are handsomely finished and lighted by electricity. A 4-minute service will be maintained during the busy hours of the day and an 8-minute service at other times. The distance to be covered is about a mile.

Mr. Russell Dale has been appointed Chicago representative of the Carpenter Steel Co., with headquarters in the Commercial National Bank Building, Chicago, Ill.

The Keystone Automobile Company, of Pittsburg, Pa., have secured the agency for Rapid commercial motor wagons and will handle this line in the future.

The Knox Automobile Co. has recently completed a fine new motor ambulance for the Springfield Hospital, of Springfield, Mass. The body is mounted on a Model H chassis, having a 30-horsepower, four-cylinder motor and selective sliding gear transmission with shaft drive. The weight of the car is approximately 3,000 pounds and the maximum speed 40 miles an hour. The panel body is 7 feet long, 45 inches wide and 5 feet 8 inches high. There are two swivel chairs for attendants and folding bracket arms for a stretcher. The driver is protected by a wind shield and storm curtains. A pair of headlights and a pair of side lamps are lighted by electricity, while a swivel searchlight is fed with gas from a gas tank. Two extra demountable rims are carried.

By the terms of a contract for the exclusive selling agency for Darracq cars in the United States, which has been entered into with the French makers by Henry Ducasse & Co., of New York City, that firm will handle the sale of Daceacq taxicabs as well as of pleasure cars and chassis. Sub-agencies are to be established in many of the large cities throughout the country, and an energetic selling campaign will be started.

The Randolph Motor Car Co., of Chicago, has opened offices in the Times Building, New York, and intends to vigorously push the sale of its motor trucks and wagons in the metropolitan district. The company has recently increased its facilities in the big West side plant in Chicago and has a very complete line of work vehicles ranging from a 1,500-pound delivery wagon to a 5-ton truck. Mr. Leon Arnstein, who is interested in the company, is in charge of the New York office.

After three years' experience in pushing the sales of Frayer-Miller trucks in Boston, W. L. Nichols, of the well-known firm of D. P. Nichols & Co., cab and carriage builders, has opened an agency in New York under the name of The Motor Truck Co. and will handle a full line of commercial motor vehicles, making a specialty of the "Frayer-Miller." The new company has offices and showrooms in the modern fireproof building, 244-250 West Forty-ninth Street. The sales methods of the company are something quite distinctive in the motor truck field and are likely to prove an agreeable surprise to the purchasing public. Charles E. Stone, the well-known motor truck specialist, has been employed as general manager.

A small tool for handling cotter pins, which makes their insertion or removal in places where it would be practically impossible to use a pliers, has been placed on the market by the Auto Specialties Co., 103 West 137th Street, New York. The tool is sold at a low price, and as it takes up little room it is really indispensable in the vehicle tool kit.

A new office has been opened in the Trussed Concrete Building in Detroit by Mr. Frank J. Campbell, an advertising specialist in the motor vehicle field. The business was formerly conducted from 242 Griswold Street and its increase has made necessary the removal to larger quarters.

The National Sales Corporation has moved its offices and warerooms from 296 Broadway, New York, to 232 West Fifty-eighth street, where it now occupies an entire building jointly with the Emil Grossman Co. The new location is in the heart of the automobile sales district. A very complete line of accessories will be carried.

James L. Gibney & Bro. have just moved into new and enlarged premises adjoining their old establishment at 215 North Broad street, Philadelphia. They now occupy a three-story building, 40 by 100 feet. An accessory showroom will occupy the entire first floor, fitted up to display the very extensive line handled by this concern to advantage. Additional facilities are provided on the upper floors for handling the large tire business of this house, which includes the Gibney wireless motor truck tire. The new establishment is one of the most complete in its line anywhere in this country.

Seekers after store and garage property to lease or purchase in New York City should be interested in a unique booklet issued by Gross & Gross, real estate agents, located at Fifth Avenue and Thirty-fourth Street, who make a specialty of motor car locations and have made a special study of the automobile section of Manhattan. The unique character of the booklet is due to the fact that there is practically no text, all the pages being occupied by halftone engravings from photographs of thirty-three garages, salesrooms and depots occupied by motor car concerns, all of which were leased through Gross & Gross or the sales negotiated by them.

Flour City gas-engine traction machines for plowing and heavy farm work are illustrated and described in the new catalogue, No. 15, issued by the Kinnard-Haines Co., of Minneapolis, Minn., manufacturers of these traction engines and also of portable and stationary engines. One of the interesting features of the catalogue is the reproduction of the gold-medal first prize and diploma awarded to the 30-horsepower, four-cylinder traction engine entered by the company in the agricultural motor contest held in Winnipeg last July. The engine plowed more ground and hauled a greater load in a given time and with less water and fuel consumption than any of its competitors. Photographs of the engines at work plowing, threshing and hauling wagons are also reproduced.

Lack of adequate transportation facilities betwen the Lackawanna railroad station at Morristown and the town of Mendham in New Jersey has led to the purchase by the Mendham Garage Co. of a 20-passenger Manhattan stage that will be put into service this month, making two round trips daily, covering the distance one way on a regular schedule in 40 minutes.

R. W. Harroun, inventor of the Harroun bumper for motor cars, is now associated with the Factory Sales Corporation, 1438 Michigan avenue, Chicago, in a selling capacity. The Factory Sales Corporation has the selling agencies for Lavalette & Co.'s Eiseman magnetos, the New York Coil Co.'s ignition coils, the Reading Steel Casting Co.'s castings, Wheeler & Schebler's carbureters and magnetos and other motor car specialties.

According to claims made in a bulletin issued for circulation among sundries and supply dealers by the Remy Electric Co., of Anderson, Ind., more Remy magnetos have been sold for use on 1909 cars than of all other makes combined. Among leading makes of cars on which the Remy is regularly fitted are the Apperson, Pope-Toledo, Buick, Oldsmobile, Maxell, and Overland.

Prices for all sizes of Gibney single and dual solid truck tires are quoted in a catalogue of 150 pages issued by James L. Gibney & Bro., of Philadelphia. The Gibney tires are made in thirty-seven different diameters from 28 inches up to 64 inches and in six widths from two to five inches. They are of the endless sidewire type. In addition to making the truck tires Gibney & Bro. are distributors of the Continental pneumatic tire and carry a complete line of American and foreign motor car accessories, which are illustrated and priced in the catalogue.

Through the agency of the Wholesale Supply Co., 17 State street, New York, R. H. Horner & Co., high-grade furniture makers and dealers, of West Twenty-third street, have bought a Plymouth 2-ton furniture truck with double variable friction drive. The truck makes daily deliveries to points 30 and 40 miles from the center of the city without any difficulty, displacing three teams and enabling two men to do the work of six.

A report published in the daily newspapers to the effect that the Philadelphia Rapid Transit Co. is contemplating the installation of "trackless trolley" electric vehicles for the transportation of express and merchandise matter as was done in Pittsburgh and New Haven is denied by General Manager Charles O. Kruger, of the company, who says that there is not an atom of fact in the statement and that no such plans are or have been under contemplation. The management was approached on the subject, but gave the project no encouragement.

Huntington and Worthington, Mass., are to be connected by a motor stage line during the coming summer. The service is to be started about June 1 and continue until October. A Knox 'bus has been bought for the purpose, and passengers and baggage will be carried. The business will be conducted by the Worthington Transportation Co., of which Harry C. Lapham, of Springfield, is president; A. W. Trow, of Worthington, vice-president; Elisha H. Brewster, of Springfield, treasurer, and Howard C. Brewster, of Worthington, manager.

Pittsburg has purchased a 40-horsepower Pierce-Arrow car especially equipped for use by the bureau of police of the department of public safety. It is the intention to use the car principally for riot and emergency calls. To that end dash cabinets have been arranged to carry revolvers and handcuffs, while heavy holsters, large enough to hold three rifles, are attached to the back of the front seat. On the running boards are two large fire extinguishers.

The Boston Edison Co. put into service last month a new General Vehicle Co. electric delivery wagon for the use of the lamp department. This is a single motor machine driven by a very small motor and battery but capable of a speed of 12 to 16 miles an hour and of running about 40 miles on one charge, which is the maximum number of miles over which deliveries can be made in a day by two men. The wagon takes the place of two horse-drawn wagons and four men.

More than fifty motor trucks have been sold to concerns in and around Indianapolis since the summer of 1907 by the Indianapolis Motor Car Co., of that city, which deals exclusively in commercial vehicles.

Akron postoffice authorities are considering the recommendation of the purchase of a mail collection and delivery cart to replace the horse-drawn carts in use at present. In a test made recently with a Brush package cart equipped with Motz tires the machine did between 7:15 a. m. and 9:45 p. m. one day all the work that is ordinarily done by the three horses used by the postoffice. On 13 runs, averaging from 12 minutes to two hours in length, it covered 35 miles and made 322 stops. Bids were received in the latter part of April by the Akron, O., board of public safety for a combination motor fire engine, chemical and hose wagon, to be used in South Akron. Early delivery will be one of the requirements of the contract.

A factory for the manufacture of motor trucks is to be erected in Council Bluffs, Ia., by the Nevada Motor Co., on property recently purchased at the corner of Main street and Washington avenue.

An order for ten Coppock gasoline motor trucks has been placed with the manufacturers by John E. Morand, of the Frank Bird Transfer Co. and the Indianapolis Transfer Co.

The heart of the Yellowstone Park is now to be made comfortably accessible to tourists by motor stage. Capitalists of Chicago and Des Moines have organized the Wyoming Auto Transit Co., with authorized capital stock of $50,000, for the purpose of running a line of motor cars to carry passengers, mail and freight over a 200-mile route from Rock Springs, Wyo., into the heart of the park.

The Northwestern Military Academy at Highland Park, Ill., has placed an order for a Cadillac 30 demi-tonneau, which is to be equipped with a Colt automatic rapid-fire gun mounted over the dash, to be operated by the man who rides with the steersman. Ammunition and additional men can be carried in the rear. The academy authorities expect to send the car on a trip to Washington during the summer to demonstrate to the War Department heads the suitability of the motor car for military use.

Motor trucks are to be manufactured in a new one-story brick factory that is being erected in the Midway district of Minneapolis by the Dilver Mfg. Co., recently organized by a number of Mankato business men.

"Doe-wah-Jack" light trucks and Lindsley delivery wagons are to be represented in Minneapolis by the Benedict Motor Co. The "Doe-wah-Jack" is built in 1,000, 1,500 and 3,000 pound capacities by the Dowagiac Motor Car Co., of Dowagiac, Mich., while J. V. Linsley & Co., of the same place, manufacture delivery wagons of two sizes and a sight-seeing car.

Contracts have been let by the York Carriage Co., of York, Pa., for the erection of a new factory building 200 by 50 feet and two stories high which it will use exclusively for the manufacture of commercial motor vehicles. The building is to be ready for occupancy on May 1. Experts have been busy for some time on the design of the new vehicles and employment will be given to more than 100 men at the start. The management is convinced of the growing demand for power vehicles and will push the commercial vehicles to the limit, although the carriage works will be continued.

Students in the H. H. Franklin Mfg. Co.'s automobile school in Syracuse have been provided with a stationary Franklin car to be run indoors, so that they may become familiar with its operation before venturing out on the street amid traffic. The rear wheels of the car are jacked up so as to run free of the floor, but a revolving drum will soon be provided, upon which the wheels will run. Since its inception at the first of the year, the Franklin school has expanded until now it has three courses instead of one. The first course is for repairmen; one of the new courses is for training chauffeurs and the other for representatives of a number of the office departments of the factory.

An Oldsmobile has been bought by the Atlantic City Fire Department for the use of the fire chief. The car will be equipped with fire bell, chemical extinguisher and an artillery box in the rear to carry the chief's helmet, rubber coat and other equipment.

The Commercial Vehicle

Vol. IV June 1909 No. 6

SUCCESSFUL INTERURBAN EXPRESS SERVICE

Details of an Extensive Business Conducted by the Hackett Motor Car Company Between Paterson, N. J., and New York City, Using Gas Motor Vehicles—Ten Machines Now in Operation

HARRY W. PERRY

It will doubtless be admitted without argument or explanation that when any individual or group of men with small capital starts out to compete on a considerable scale directly with the established express companies doing business by rail he or they have a man's task to accomplish. Yet this undertaking has been carried on successfully for the last two and a half years by means of motor trucks between Paterson, N. J., and New York City, a distance of 17½ miles by wagon road. And from a single gasoline truck with which the business was started the equipment has now grown to ten, the last of which was bought in May, this year. Each of these trucks makes one and very often two round trips a day, or 70 miles, with from three to five tons of freight, and they run every working day in the year and on some holidays.

BAD STRETCH OF ROAD ON THE ROUTE FROM PATERSON TO NEW YORK

The motor trucks are the backbone of an express business that reaches important proportions. Some idea of its magnitude may be gathered from the fact that in addition to the motor trucks, which are used chiefly for the long-haul work between the two cities, it keeps constantly busy six horse-drawn wagons for collecting packages in Paterson and seven similar wagons in Passaic and New York for delivering and collecting. Officers of the company are now seriously considering the advisability of replacing all the horse wagons used for this work in Paterson and Passaic by several smaller motor trucks, which will greatly facilitate the handling of goods, making possible a 2½-hour delivery service between Paterson and

New York. The operating company has 200 regular customers at whose places two calls a day are made, and of these 110 are charge accounts. The company—the Hackett Motor Car Co.—does a regular express business, almost exactly on the lines of the big national express companies except that instead of making its shipments by railroad it makes them by motor truck and confines its operations to places that can be reached in a day from the head office and station in Paterson. It is a common carrier and receives for transportation almost anything offered. The great bulk of its work, however, is hauling silk, in skeins and woven into ribbons and cloth, from the silk and dyeing mills in Paterson into New York and bringing back loads of silks and miscellaneous merchandise.

REGULAR SCHEDULES OF CALL

This is an exacting service, one that involves regular schedules of call and delivery and that brooks no long or frequent delays in transit. That it should have been in continuous operation for more than two years and the number of motor trucks steadily increased from the one original car to the tenth machine, bought as recently as last month, is a more convincing evidence of the suitability of the gasoline vehicle for this sort of work and of its reliability, efficiency and economy than any array of figures that can be brought forward from performances in demonstration work.

This is a straight business proposition; there are no frills about it; nothing is done for show or effect; the goods are hauled purely and simply for the money there is in it and in competition with several express companies that ship by the main lines of the Erie, the New York, Susquehanna & Western and the Delaware, Lackawanna & Western railroads. Obviously, then, the service given to customers must be better than is the case with the other express companies, and it is equally evident that the cost of operation and maintenance of the motor trucks cannot be excessive or the business would not be profitable and the stockholders would not go on increasing the business and the equipment.

There is no room for skepticism here. Anyone can go and see the way in which the business is conducted, and there is no mystery about it. There is not, as might be supposed, any elaborate garage and machine-shop equipment, nor any extensive attempt at systematic inspection, cleaning, adjusting and repairing. In fact, it is a matter of surprise to note the dirty, mud-spattered, unkempt and unprotected appearance of the machines and the apparently reckless abuse that some of the drivers give the trucks. "Oh, these machines will stand anything," said one driver, as he advanced the spark and sped one of the three-ton trucks at twenty miles an hour, empty, over granite-block pavement and street-car tracks. "This pounds h——l out of her," he said, a little later when he could make himself heard, "but what are you going to do? They tell you not to drive like this but you have to keep to the schedule and when something delays you you have to make up time."

OPERATED ON BAD ROADS

And they are not boulevards, by any means, that these trucks operate on. New Jersey is famous for her hundreds of miles of magnificent macadamized highways, and justly so, but the one place where it might be supposed the state would be most sure to have good roads—that is, the main arteries of vehicular travel back into the state from the shore of the Hudson River directly opposite the metropolis—is the particular place where the roads are execrable and have been for many years. These roads are the notorious Turnpike, Plank Road and Paterson Road across the great Hackensack or Jersey meadows. Extending for several miles across the great salt marshes, they are only a few feet above tide water and never have been properly macadamized or thoroughly paved. Last year the grade of the Paterson Road was raised several feet by filling in with red clay and the work of surfacing this with crushed trap rock and rolling with steam rollers has not yet been completed. The wagon road occupies the space between two street-car tracks, and earth thrown up when digging trenches for the ties formed slight embankments on either side of the road that prevented the water from running off during the past spring. As a consequence, the surface of the road, from side to side, was simply a sea of water and mud for long stretches, and the heavily laden trucks of the Hackett Company sank down until the mud came up to the hubs and axles. After the water partially dried off, there could often be seen long ridges of mud, the tops of which had been scraped off flat by the axles as the trucks passed.

Not only is mud encountered in wet weather, but all the year around there are steep grades to be climbed on the regular route. In Union Hill on the east shore of the meadows is a long hill with probably a 10 per cent grade that winds and twists from the flats up onto the heights overlooking the Hudson River at Weehawken. These heights are a continuation of the ridge that forms the famous palisades of the Hudson, and at this point rise to a commanding height of some 300 feet above the river. On the river side there is a sheer solid-rock bluff towering directly above Weehawken, with its West Shore Railroad terminal and ferry houses. The road zigzags down this at even a steeper grade than on the meadows side of Union Hill. Both roads are paved with granite blocks, although up to last year only half of the Weehawken hill was so surfaced, the other side being "paved" with clay and round cobblestones of all sizes, up to that of a man's head.

After these two hill roads have been negotiated the difficulties are not all passed, for the trucks have to be driven onto the ferries, and if the tide is very low this involves a short but steep incline to ascend when leaving the boat, and sometimes, if the float is not lowered enough, there is an abrupt drop of from 6 to 8 inches from the float to the deck of the boat, which is bridged by a short, heavy gangway. Only recently the heavy jolt given one of the trucks in making this crossing resulting in the breaking of a distance rod.

Even in Paterson the streets are hilly and either roughly paved or not paved at all. And wherever the trucks go, with the exception of the stretch across the meadows, there are innumerable railroad and street-car crossings to make, besides bridges over the Passaic and Hackensack rivers. So, altogether, it will be seen that the routes and working conditions are about as severe as would be likely to be encountered anywhere.

WEATHER CONDITIONS IN WINTER

Snow, ice and cold weather of winter naturally greatly increase the operating difficulties, yet General Manager

VEHICLES AT THE LOADING PLATFORM OF ONE OF THE PATERSON SILK MILLS

P. W. Cyphers says that throughout last winter no car was more than two hours off schedule; that none was out of commission for any length of time during the winter and that there were never more than two cars in the garage at one time undergoing repairs. During the heavy snowstorm of January 25, 1908, when two feet of snow fell on the level, the company put seven car loads of freight over the road to New York, bringing back loads to Paterson the same afternoon, and making deliveries of all the stuff in New York before 10 a. m. the next day. In notable contrast with this, observations showed that the regular express companies, operating by railroad, did not finish their deliveries of goods collected in Paterson on the 25th until 3.30 o'clock the following afternoon in New York. So much for the dependability and despatch of the motor express service.

The rolling stock of the Hackett Company consists of seven 5-ton trucks, two 3-ton trucks and one 2-ton truck. These are all Manhattan gasoline machines, for which the Hackett Motor Car Co. has the exclusive sales agency for New Jersey. They have four-cylinder vertical engines under the driver's seat and three-speed sliding gear transmission. As a direct result of the practical, every-day demonstration of the machines in their own express service, the company has made a considerable number of sales of similar trucks and of Manhattan sightseeing cars in Paterson, Passaic, Rutherford, Jersey City and other cities and towns in Northern New Jersey and also in New York City.

Besides its express depot at 218 Paterson street, in Paterson, which many years ago was used as a silk dyeing establishment, the Hackett company has a freight transfer depot in lower New York City, at the corner of Beech and Greenwich streets, another at 39 Lexington avenue, Passaic, and a sales office and garage at 247 Market street, Paterson. George Hardy Payne, of Paterson, is president of the company, and most of the stock is held by Paterson men. P. W. Cyphers, the general manager, was picked for the position because of his knowledge of the express business, having been for years an auditor for one of the big express companies.

ONE TRUCK KEPT IN RESERVE

One of the ten motor trucks in the service is always kept in reserve in the garage or freight depot. Usually work of some sort is being done on it, but it is in such condition that it can be sent out to pick up and deliver the load of any of the other machines that might be disabled on the road from any cause. This reserve machine is not always the same truck, of course, but may be one car one day and another the next, according as work is needed to be done upon them. During a part of the month of April, for example, truck No. 1 was the reserve car, as a new body was being built for it. When this work was finished, No. 8 was taken off the route to have a new body built and No. 1 went into service again.

One of the trucks follows a special daily route from Paterson to Union Hill, Hoboken, Jersey City and West New York and back to Paterson, thus confining its operations to the Jersey side of the Hudson. The other eight machines make the regular run from Paterson through Passaic and Rutherford to the New York City office and return over the same route, calling on the way at the Passaic office of the company. The trucks average about ten miles an hour running time loaded, and make the 17½-mile trip, including about 20 minutes allowance for getting across on the ferry, in just about an hour and 50 minutes. The round trip of 35 miles is completed in five hours, including loading and unloading.

The machines are run day and night and are operated on a regular schedule. Nearly 80 per cent of the work of the company is done between 7 o'clock at night and 7 in the morning. The other 20 per cent is on special deliveries. The heavy shipments from the factories all come at night, collections being made from 5 to 6 p. m. Light collections are made in the middle of the day from noon to 1 o'clock. Most of the collections are made by horse-drawn wagons, but the heavier ones are made by motor trucks, the trucks doing this work in addition to making the long trip into New York. Beginning at noon, the trucks leave Paterson for New York on the following schedule: 12 m., 12.30 p. m. (delivery of their loads being made to the New York consignees the same afternoon) 6.30 p. m., 7.30 p. m., 8.00 p. m., 8.30 p. m., 10.00 p. m., 4.30 a. m., 5.00 a. m. and 5.30 a. m. This schedule is followed every day except Saturday, when shipments from the mills are light and the service ends at midnight. Several of the trucks are engaged in special work, such as hauling machinery, lumber and furniture, and do not run on schedule. No Sunday work is done, and the Sabbath is reckoned to begin at 12 midnight Saturday and to end at 12 midnight Sunday.

While the bulk of the goods handled is silks, the company carries almost everything given to it, including fresh vegetables and even eggs. Large quantities of fresh eggs in crates have been handled without the loss of a nickel's worth, according to Mr. Cyphers. The silks are either packed in large fiber trunks or put up in heavy canvas sacks especially made for the purpose. The largest trunks, when full, will weigh 300 pounds or more, while a well-filled sack weighs about 200 pounds. These are handled by the driver of the truck and his helper who accompanies him, although additional assistance in loading and unloading is usually given at the platforms in the depots.

Merchandise is divided into three classifications by the company—hardware, silk and merchandise. Hardware is carried at the lowest rate per pound, because of the small space it occupies in proportion to its weight, while silk and merchandise (which includes green goods and miscellaneous articles) are charged for at a higher and nearly equal rate. A sliding scale of rates is maintained, in about the following proportion, although not at the precise figures: 20 pounds, 20 cents; 40 pounds, 25 cents; 60 pounds, 30 cents, and 100 pounds, 40 cents. For all the stuff handled the average rate is approximately 45 cents per 100 pounds. A lower scale of rates was adopted when the business was first started, doubtless as an inducement to gain customers who were skeptical of the ability of the company to maintain a schedule with self-propelled vehicles operating over the wagon roads, especially through the winter. But after a time it became apparent that the business could not be conducted at a profit at the lower tariff and an increase of rates was made to those now prevailing.

Daily records of the work done by each truck are kept in the office, although no records are kept of the tonnage hauled by each, since this would involve too much work, and the business is conducted for the purpose of making money rather than to make records and a lot of attractive or formidable pages of figures, according as you view them.

Taking at random truck No. 3, of five-tons capacity, the totals of the daily record for the month of March last show that forty-one round trips were made between Paterson and New York, aggregating a mileage of 1,835. On eleven days it made two round trips and on one day it made three, while only one round trip was made on each of the remaining days. It would have made two round trips every day but for the fact that the road was being repaired on the regular route by way of Rutherford and all of the machines had to go by way of Hackensack, which added 5 miles to the length of the route, increasing the round trip to 45 miles. The average load hauled was 5 tons each way, or 410 tons for the forty-one trips made in the one month.

A little figuring will show the magnitude of the business. If the nine trucks regularly in service make two round trips daily, or twenty-six round trips a month, and average say 4 tons at each load or 16 tons a day each, we find that they haul 3,744 tons a month, or practically 45,000 tons annually, or 2,000 railroad car loads.

SPECIAL SERVICE FOR TRUCKS

Very often one or more of the machines is taken off the regular service to do special work. For instance, through the month of April car No. 9 was kept at work moving household furniture. Here is the record for one week's work: April 19, left Paterson and ran to Norwalk, Conn., approximately 60 miles, with a load of furniture, unloaded and returned to the Bronx (upper New York) the same night; April 20, picked up a load and delivered it in Paterson, about 25 miles, at noon; April 21, made two round trips to New York (70 miles); April 22, left Newark at 5 a. m. with a load of household goods and ran to Monroe, N. Y., where they were discharged and returned to Paterson (round trip, 100 miles); April 23, went to Yonkers, N. Y. (30 miles) and returned with a load of furniture to Paterson; April 24, left Paterson at 8.30 a. m. with a load of furniture for Beaver Lake (65 miles) unloaded and returned to Paterson that night.

Each driver has his own car; that is, he is assigned to a particular truck and is given a helper, and the two work together on that car until some exigency makes it necessary or desirable to put them on another machine or to separate the men and form new combinations. Each man works 12 hours a day when on regular duty, but sometimes they have overtime work. The driver is required to take care of his machine himself, inspecting, cleaning and adjusting it and making the simpler repairs that do not call for the machinist's attention in the repair shop. As the work is conducted, the machines get very little cleaning and the bodies as well as the entire running gear are heavily coated with dried mud during seasons of the year when the roads are wet. It is expected, however, that the drivers and their helpers will wash off the vehicles at such times as a trip is missed; that is, when only one of the two regular runs into New York is made in a day.

The drivers receive $3 a day for their work. They inspect the car before each trip and fill the lubricator with oil before leaving Paterson and upon arriving in New York. The drivers are variously recruited. Talking casually to two of them, it was learned that one had formerly been a locomotive fireman and in a few months more would have become an engineer while the other had been a casket maker. The former had gotten into the motor-truck service through the recommendations of friends who were working for the company, and the latter had become familiar with the operation of motor vehicles by working around private machines owned by a man who spent his summers at one of the New Jersey lake resorts where the casket maker went for his vacations.

COSTS OF OPERATION

Manager Cyphers gives the following items as the average cost of operation per day per truck: Driver's wages, $3; helper, $1.61; wear on tires, $1.40; 24 gallons of gasoline at 10 cents, $2.40; and 2 gallons of lubricating oil at 80 cents, $1.60. This is the consumption when two round trips are made. Approximately 12 gallons of fuel and 1 gallon of oil are used on each round trip of 35 miles. This rather excessive use of oil is intentional as the drivers are instructed to use an excess rather than a deficiency. To this is attributed in large measure the comparative freedom from mechanical difficulties. The company considers that oil is cheaper than delays and breakages.

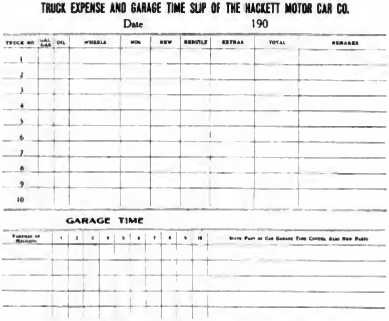
Cost of upkeep, apart from rental of buildings, office and executive expenses and other items not directly appertaining to the machines, is only the cost for tire renewals and for machinist's charges. Tire manufacturers are now putting tires on the market that wear generally from six to seven months. The new rubber block tires made by the Consolidated Rubber Tire Co. are now being used altogether on the rear wheels, and Firestone endless solid rubber tires predominate on the front wheels. Almost every well-known make of tire has been tried, even including wood-block tires. A pair of the latter stand discarded in the express depot, and one of the drivers, when asked regarding how they had stood up to the work, said they were worn down in two days.

Depreciation, or wear and tear, is impossible to calculate, according to the general manager, as the business has not been conducted long enough to determine this. Practically, however, this item is synonymous with the cost of machinists' work, for breakages are repaired and replacements made as they occur and the trucks thereby kept up to full efficiency. They do not wear out to the extent of being junked and replaced by new machines. In motor vehicle work it is common to estimate depreciation at 20 to 25 per cent. of the purchase price, allowing a life of four or five years for the machines. The experience of the Hackett Company, however, appears to show that this is excessive, since the first of its trucks, car No. 1, bought 4½ years ago, and the first machine ever delivered by the builders to a purchaser for actual use, is still in use and giving as good service as any of the nine machines bought subsequently. In fact, this car has a larger body than the other trucks and is generally liked better than most of the machines. During the month of April it was engaged on a special job of hauling 600 tons of machinery from the upper part of New York City out to Paterson, averaging 5 tons to the load, and on one occasion carrying a single piece weighing more than 13,000 pounds, which it hauled up one of the worst hills in Paterson. Since then this truck has had a new body to replace the original one, which was worn out.

REPLACING A TRUCK BODY

The building of this body, by the way, illustrates one of the ways in which the Hackett Company makes its enterprise successful. Instead of having the job done outside, at a cost of $200 or more, it had the body made in its own shop by its own body maker and carpenter, who, from his own and the manager's intimate knowledge of the special requirements of the service, was able to build a stronger and better body than could have been bought from a regular wagon works. The cost of the work amounted to only $60, not including the carpenter's time. The body was put through the company's own paint shop, from which it emerged an orange yellow. This color will be adopted for all the other trucks, which in time are to be painted to correspond.

TRUCK DELIVERING LOAD IN CITY WAREHOUSE



TRUCK EXPENSE AND GARAGE TIME SLIP OF THE HACKETT MOTOR CAR CO.

Date 190

TRUCK NO.	GAL. GAS	OIL	WHEELS	HOS.	NEW	REBUILT	EXTRAS	TOTAL	REMARKS
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									

GARAGE TIME

Number of Machinist	1	2	3	4	5	6	7	8	9	10	State Part of Car Garage Time Covers, Also New Parts

BLANK GARAGE REPORT OF THE HACKETT COMPANY

It might naturally be expected that after 4½ years of such strenuous service, a motor truck would need frequent and costly repairs. Here is the record of repair work done on No. 1 for the eleven months ended with last March, as taken from the record book in the office:

May (1908) $1.40; June (truck completely taken down) $50.20; July, $8; August and September, nothing; October, $6.28; November, $3; December, 50 cents; January (1909) $4.10; February, $1.50; March, $1.50. Total, $76.48.

The foregoing prices are for new parts and fittings and do not cover the cost of machinist's time. The job of overhauling was completed in two days, four of the drivers and helpers being put on the work of taking the car down for examination of the bearings and other parts. Most of the replacements were of minor attachments, such as grease cups and other inexpensive parts that did not require much time to fit.

At the end of each round trip the driver of a truck is required to post on a large blackboard in the station a memorandum of any work on the truck that calls for the machinist's attention or any replacements that are needed. Each day these are attended to by the machinist and each night the machinist makes a daily report of work done to the office. Thus is kept a record of labor on each machine and cost of new parts. The items are added to the same day's record of work done by each truck. A reproduction of the blank garage report sheet is presented herewith. A stock of repair parts aggregating upwards of $1,000 in value is generally kept on hand, although in April this was down to between $500 and $600.

LUBRICATION OF GASOLINE VEHICLE MOTORS*—I

A Practical Discussion of the Subject, Including Consideration of the Friction of Solids and Liquids; Troubles Arising from Carbon Cylinder Deposits; Liquid Lubricants and Means for Their Application to Motors

J. W. G. BROOKER, F.I.C.

ALTHOUGH not absolutely essential, a little knowledge of the scientific aspect of friction elimination will be useful in enabling you to follow the why and wherefore of the systems of lubrication with which I propose to deal fairly fully later. I offer no excuse, therefore, for first outlining briefly a few theoretical and practical points on lubrication. In the first place, you are all probably aware that practically speaking it is impossible to rub two pieces of metal vigorously backwards and forwards over one another for more than a few minutes if the surfaces are dry. A lubricant must be used, and it must be of sufficient viscosity or body that it will not be squeezed out if the sliding plates are strongly pressed together. Further, if the two pieces of metal are hot the oil must be sufficiently heavy when cold to have sufficient body when warmed by the metal to resist the maximum pressure that can be put upon it.

Another point calling for discrimination in the choice of an oil is the quality or smoothness of finish of the rubbing surfaces. The oil film which we endeavor to preserve intact between the faces is at the best a very thin one, and the metals are very near touching each other when they are comparatively rough and poorly finished. It is obvious that while a light oil suffices for very smooth surfaces, other things being equal, a heavier oil is necessary when there are inequalities and roughnesses to be neutralized. Much the same result can be obtained by the use of a larger quantity of the light oil; but at the best it is not so satisfactory from the point of view of reduction of wear and tear. A practical illustration of this will occur to you. Every car as turned out from the assembling and testing shops is in the rough state, comparatively speaking. The glassy surfaces have yet to be acquired, and it is the purchaser who, in ninety-nine cases out a hundred, has to accomplish this transformation. In the rough state the risk of bearings, pistons, etc., seizing is very much greater than after every surface has become smooth and polished, and the motorist, if he be wise, will not spare the lubricant for the first few hundred miles. After this stage the supply can be appreciably cut down, as much less is required to keep two highly polished surfaces from touching each other than rough faces.

Another condition, and one that largely governs the choice of an oil for cylinder lubrication, is the mean temperature of the cylinder wall. This is mainly dependent upon the efficiency of the cooling system, the rate at which the engine normally runs, the degree of compression, the initial temperature of the explosion, the ease or otherwise with which the exhaust gases are ejected, and last, but not least, the capacity of the spark to ignite comparatively weak mixtures effectively. The ideal to be arrived at is the oil that at the working temperature has sufficient body to prevent the piston rings from time to time cutting through it and scraping the cylinder walls.

INFLUENCE OF FLUID FRICTION

There is, however, another aspect of lubrication and it is one that very materially complicates the whole question. It is, in brief, fluid friction. In the foregoing remarks I have throughout advocated the use of the oil that will be heavy enough to keep the metal surfaces from touching. But it is possible to go too far; in other words, to err on the right side and to choose too thick an oil. One, in fact, that will keep the surfaces apart as is necessary, but will require the expenditure of more energy to get the same number of revolutions per minute than if a lighter oil were being used. Putting it in a non-technical way, I might say that a thick oil has a clogging or braking effect on the moving mechanism on which it is used. Energy is needlessly expended in moving planes of heavy lubricant over one another.

"Fluid friction" is a factor more particularly to be reckoned with in relation to piston speed and revolutions per minute of shafts and spindles. The energy required to revolve a light spindle in its bearing is enormously increased by the use of a heavy oil. The faster the spindle normally revolves the more noticeable is the difference effected by a change in the viscosity of the oil. The instance in which a slight increase in the viscosity of the oil used for the spindles throughout a cotton mill stopped the engine is probably familiar to you all. The extra energy required to revolve each spindle was negligible till multiplied by several thousand.

The position as regards piston speed is somewhat analogous. The most suitable oil when high speed is required is that which is just heavy enough to prevent the rings breaking through the film and scraping the cylinder wall. Any lubricant heavier than this is entailing the expenditure of more power to keep the piston moving at the same speed. Of course, for normal running purposes, when nothing is to be gained by taking risks, a somewhat heavier oil than the lightest possible is preferable. A little more power is absorbed in overcoming the internal friction of the engine itself, but one has the satisfaction of knowing that it will run for a longer distance before parts require renewing.

When starting up a cold engine, the difficulty that is experienced in getting the handle round, especially when a heavy oil is used, is a measure of the fluid friction of the lubricant reposing between the piston and the cylinder wall. After the engine has run for a few minutes, the pistons are no longer stiff to move, and the motorist is apt to jump to the conclusion that in that state of things fluid friction is negligible. The reverse, however, is the case, particularly if it is a high-speed engine, and it is nearly as important to choose oil light enough as to choose it heavy enough for the purpose required.

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*From a paper read at the Royal Automobile Club Associates' headquarters in London.

CARBON DEPOSIT IN CYLINDERS

Much has been said and written on the subject of carbon deposit, and the question is as important as ever. Before, however, discussing the causes of the formation of carbon, a few words as to its effects may be of interest. In the first place, it acts as a non-conductor of heat, and in the case of the many cars on the road in which, when the pump and radiator are working well, the cylinders are kept too cool, its presence in a small quantity is actually beneficial. To obtain the highest efficiency from the fuel, the charge of gasoline and air at the moment of its ignition must be both highly compressed and hot. The hotter it is and the more highly it is compressed the greater is the power obtained from any particular weight (not volume) of mixture within reasonable limits. (I am assuming that this mixture of gasoline and air is in the best proportions.) A highly compressed and hot charge burns more quickly, and the effect is somewhat the same as when using a very hot spark and advanced ignition. When the cylinder walls and head are kept too cool, the temperature and pressure of the compressed charge are too low; the temperature and pressure at the completion of ignition are, as a result, too low, and the power curve is, in consequence, smaller in area than it might be. Scientifically put, the curve of compression is almost an isothermal one when the cooling is excessive and almost adiabatic when the cooling is feeble. Further, during the power stroke the head and walls of the cylinder and the top of the piston are all robbing the exploding mixture of a proportion of its energy in the form of heat, and the cooler these parts are the greater will be the percentage of energy lost in this way.

The obvious result, therefore, of too cool cylinder walls and piston is that less power is obtained from the same unit of fuel, or, in other words, if less heat is lost through the cylinder walls, more useful energy will be obtained from the same quantity of fuel.

Please let it be understood, however, that the above is not a defense of carbon deposit, but a plea for rational cooling. Instances of cars which do not run at their best till ten miles or so have been covered will probably be familiar to you all. That is the distance that has to be done before the cooling system is efficiently hot.

Having seen the possible beneficial effect of a little carbon deposit, sufficient to minimize the flow of heat through the cylinder and piston, the detrimental effect of an excessive amount can be better appreciated. As before, the deposit acts as a check on the flow of heat from the interior; but the effect is now excessive, with the result that the temperature of the compressed charge is comparatively high, and the compression curve approaches the adiabatic in character. Further, if the throttle be much opened the pressure of the charge just before firing will also be excessive to such an extent that pre-ignition will probably be experienced; the mixture being sufficiently hot and highly compressed, to ignite spontaneously, that is to say, without the aid of the spark. Given the same mixture, compressed to the same pressure at the same temperature, in one case in a hot cylinder lined with carbon, and in the other case in a similarly hot cylinder but thoroughly clean, the mixture will ignite spontaneously much more readily in the dirty cylinder than in the clean. It is quite feasible to imagine that the hot rough porous surface of the carbon deposit acts as a catalytic agent in a similar way to palladinized asbestos in the presence of oxygen and hydrogen. The gasoline vapor and air in the pores of the carbon are in much more intimate contact with each other, and are therefore in a better condition to combine chemically than when they are in the open combustion chamber. The spontaneous combustion, therefore, originates from the hottest patch of carbon deposit, which, more often than not, is the layer on top of the piston. The piston has no water jacket on its other side—in fact, it usually happens that when the top of the piston is coated with carbon the underside is in a similar condition from the oil splashed up against it from the crank case. The free radiation of heat from the piston is, therefore, doubly checked.

SPONTANEOUS COMBUSTION UTILIZED

An interesting instance of spontaneous combustion put to a useful purpose is the Diesel engine, in which during the suction stroke air alone is drawn into the cylinder. On the compression stroke this charge is compressed, and as the piston is about to fall on the power stroke, a few drops of oil fuel are forced in the form of a spray from a pump into the hot air in the cylinder. The air is at about 500-pound pressure to the square inch, and it is at a temperature of about 1,000 deg. Fahr. This combination of high temperature and pressure is much more than sufficient to ignite the fuel, which burns almost instantaneously, thus adding heat to the air, which expands doing work. The oil fuel is added to the charge in the cylinder during about the first tenth of the power stroke; but this depends on the work that the engine is doing.

We have been mainly concerned hitherto with the heat-retaining effect of carbon deposit; it will be of interest now to see how it affects the pressure of the compressed charge.

An increase in the compression pressure of the charge is brought about by reducing the cubic capacity of the combustion chamber. The piston on its outward travel sucks in, practically speaking, the same weight of mixture whether there be carbon deposit or not, but on returning it compresses it into a smaller space and therefore to a higher degree of pressure when a proportion of the combustion chamber is filled with carbon.

Taking a normal size of engine—4-inch bore, 4-inch stroke—for the sake of ease in calculating, I have imagined a square-ended combustion chamber and the piston rising to within one inch of the top.

	Cubic inches.
The total capacity is	62.85
The volume swept out by the piston is..	50.28
And the combustion space is............	12.57

Taking the simplest case, viz.: Isothermal compression, the product of the pressure multiplied by the volume is constant. Assuming that the pressure at the commencement of the compression stroke is 14 pounds per square inch, the pressure at the completion of compression will be 70 pounds to the square inch.

Imagining now a carbon deposit of 3-16-inch on piston and cylinder head, we have 2.356 cubic inches on piston top, 2.356 cubic inches on cylinder head, and 1.522 on cylinder walls, making a total of 6.234 cubic inches of carbon deposit. The total volume, less carbon deposit, is $62.85 - 6.23 = 56.62$ cubic inches. The combustion space, less carbon deposit, is $12.57 - 6.23 = 6.34$

cubic inches. When the total volume is filled with charge at 14 pounds pressure per square inch, the final pressure of compression will be $\frac{56.62 \times 14}{6.34} = 125$ pounds, as against 70 pounds with no carbon.

Taking, as another example, a carbon deposit of 1-8-inch thickness on the piston and in the combustion chamber, the total volume is made up as follows:

$4 \text{ in.} \times 4 \text{ in.} \times \frac{1}{8} \text{ in.} \times .7854 = 1.571$ on piston.
$4 \text{ in.} \times 4 \text{ in.} \times \frac{1}{8} \text{ in.} \times .7854 = 1.571$ in the head.
$\frac{3}{4} \text{ in.} \times 4 \text{ in.} \times 3.1416 \times \frac{1}{8} \text{ in.} = 1.178$ on walls.

Carbon deposit total ......4.320 cubic inches.

The total volume, less carbon deposit, is $62.85 - 4.32 = 58.53$ cubic inches. The combustion space, less carbon deposit, is $12.57 - 4.32 = 8.25$ cubic inches. When the cylinder at the end of the suction stroke is filled with mixture at 14 pounds pressure the compression pressure will be $\frac{58.53 \times 14}{8.25} = 100$ pounds per square inch.

These instances of the effect of carbon deposit are purposely a little exaggerated, and it is not likely that in ordinary running as high a compression pressure will be obtained as 125 pounds per square inch; at the same time there is nothing like knowing the stage at which one may arrive by neglect of adequate precautions.

The effect—I was going to say the destructive effect—of high compression pressures and temperatures can be minimized by ample cooling arrangements, and this point was specially considered by the various designers of the 4-inch racing cars. They adopted high compression pressures to get as large a power curve as possible; at the same time they paid particular attention to the cooling to keep the compression temperature below the critical point at which there was a tendency to spontaneous ignition.

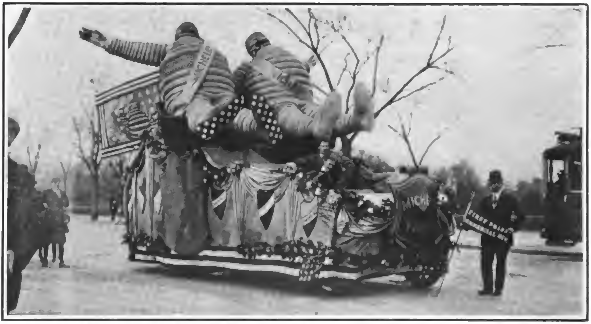
TROUBLES CAUSED BY EXCESSIVE COMPRESSION

In any case, there is no denying that the adoption of a high compression pressure has a destructive effect on the bearings of the engine, on the transmission, and to a certain extent on the tires, and that this is due to the pronounced inequality of the turning moment of the engine. With one and two cylinders the trouble is aggravated, with six cylinders it is undoubtedly minimized. The driver who starts with a properly designed moderate compression, soft-running engine has only himself to blame if he appreciably shortens its life by permitting excessive carbon deposit to convert it into a hardened thumper which kicks at every explosion. I may add that the motor cyclist is more susceptible than the car owner to the engine suffering from high compression. The latter, unless he is alert, is apt to miss the signs of impending trouble till it is acute.

TRUCKS IN NEW YORK MOTOR CAR PARADE

UPWARDS of sixty motor trucks and delivery wagons took part in the commercial vehicle and advertising section of the second annual motor-car parade held May 3 by the New York Automobile Trade Association in connection with the automobile carnival week to celebrate the eleventh anniversary of the motor vehicle in America.

The parade had to be postponed from the Saturday before—May 1—on account of cold and rainy weather, but it proved a great success, attracting many thousands of spectators to line the route on upper Broadway. It was held in the afternoon and the commercial vehicle section proved the most interesting because it was the only section in which advertising floats were permitted, and so furnished the greatest opportunity for the exercise of the ingenuity of the entrants.



SAUER TRUCK CARRYING BIBENDUM TWINS WHICH WON FIRST PRIZE IN PARADE

Nearly 800 cars of all sorts took part in the whole parade, and among these were 25 Darracq taxicabs belonging to the New York Taxicab Co. There was a considerable representation of foreign machines in the commercial section, the New York *Herald* having its seven new Renault delivery wagons in line, and several Saurer and other European trucks taking part.

Many of the trucks were handsomely or grotesquely decorated as floats, especially those of the motor car tire companies. The most grotesque of the lot was the float of the Michelin Tire Co. on an Adolph Saurer truck. This carried two gigantic figures known as the Bibendum twins, made of rubberized cloth and partially inflated. They are shown in the accompanying engraving. By means of an air-tube connection the degree of inflation was caused to fluctuate quickly, so that the general attitude and entire expression of the figures underwent uproariously funny changes. This float was awarded first prize of $500 in this section.

A float representing a Thermos bottle built on an English Napier truck and entered by the Thermos Company took second prize of $200, while third prize was given to a Matheson truck which carried as a float a large platform from which rose white fluted columns supporting the highly polished silver trophies won by Matheson cars in numerous important contests.

Much favorable comment was elicited by the Goodrich tire float on a Packard 3-ton truck, and other tire companies also had interesting floats in line.

An interesting demonstration of the great capacity of the motor truck was made by a box manufacturing concern which entered a 5-ton electric loaded with empty boxes and shooks which were piled several rows deep above the tops of the high stake sides and on the roof of the driver's cab, and also overhung the rear end by eight or ten feet like an inverted pyramid.

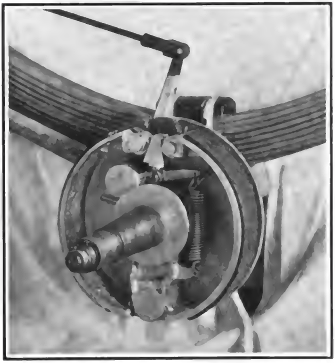
The Couple-Gear Co. of New York, entered a new type of electric truck just completed after a special design for a large contracting concern. This carried two tipping boxes of triangular cross section on trunnions high above the frame so that they could be tipped individually to either side to spill the contents.

Following is a list of the companies represented in the parade by commercial vehicles:

Ajax Tire Co., Aeolian Company, Autocar Company, Brush Runabout Company, Buick Motor Company, Bloomingdale Bros., Buffinger Bros., J. D. Books, Baker Motor Vehicle Co., Colmon Pneumatic Tire, Duffy Grease Co., The Duncan Co., Diamond Rubber Co., Empire Tire Co., Flentjes Shock Absorber, Firestone Tire & Rubber Co., Goodrich Tire & Rubber Co., Keith & Proctor, Knox Automobile Co., Michelin Tire Co., Nason Mfg. Co., New York *American*, New York Edison Co., New York *Herald*, T. G. Patterson, Randolph Motor Car Co., Runkels Cocoa Co., John Simmons Co., A. G. Spalding & Bros., Stewart Speedometer, Sentinel Tire Chain Co., Clarence L. Smith, H. H. Steinau Co., Schwarzchild & Sulzberger, Captain Louis Sorcho's Deep Sea Divers, Thermos Bottle Co., United Dressed Beef Co., United Cigar Stores Co., Union Terminal Cold Storage Co., Valvolene Oil Co., Warner Instrument Co.

GRABOWSKY REAR WHEEL BRAKE

One of the new and interesting details which give the Grabowsky truck its conspicuous originality is the rear wheel brake construction. In the accompanying engraving is shown the left hand side brake as exposed by removing the wheel which carries away with it the brake drum bolted on the hub. It will be gathered from the illustration that the brake shoes and brake anchoring arm are formed in one piece, this permits of relying upon the natural elasticity of the metal to bring the shoes back to the idle position when the brake is released. The expansion is produced by a wedge which a bell crank lever forces upwards between two rollers carried by the free ends of the shoes, pressing them against the drum and producing the required friction. The strain on both shoes is equalized by lateral mobility of the wedge which is hinged at its base on its actuating lever. The wedge can also be adjusted in height so as to make up for wear. A strong return spring pulls the expanding system back to its lowest position when no effort is made on the brake rod.



CONSTRUCTION OF GRABOWSKY REAR WHEEL BRAKE

In order to locate the wear on an easily and cheaply renewable part a fabric lining is riveted on the shoes, presenting the further advantage of smoother action.

The United States annually produces something like 80,000 motor cars, while Italy manufactures 25,000 and France 40,000. Germany is another producing nation, as in England, but the two first mentioned build the bulk of the foreign output.

Twelve motor vehicles purchased at various times by the city of Chicago are to be sold, the receipts from their sale to be applied on rental to be paid to a company which will supply the needs of the city under contract to maintain the cars in its own garage. The city found that it was costing $30,000 annually to store and keep its cars in condition, whereas it is estimated that the necessary service can be rented for about $15,000. That the cars used by the city officials are by no means idle luxuries, however, is indicated by the record of 97,000 miles traveled in two years by one of the cars owned by the city, and 52,000 miles covered in a single year by another.

DELIVERY CONTRACTORS ADOPT MOTOR WAGONS

H. C. Piercy Co., of New York City, Which Handles the Delivery Work of Eighty Local Merchandise Houses, Decides to Abandon Horses, Beginning with Twenty-five Studebaker Electric Wagons Next August

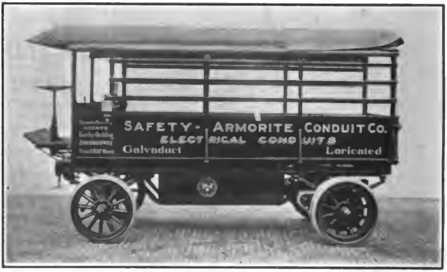
INDICATIVE of developments in the commercial vehicle field that may be expected henceforth is the significant fact which has just become public that one of the large delivery contracting firms of New York City has decided to replace all of its horse and wagon equipment with motor vehicles just as fast as circumstances will permit without sacrificing too much on its large investment in the horse-drawn outfits. This is the H. C. Piercy Co., with main offices at 422 West Fifteenth street, which maintains more than 200 wagons and trucks and about 300 head of horses and does all of the delivery work for more than eighty leading retail merchandise houses in Manhattan and Brooklyn.

ONE OF THE PRESENT PIERCY WAGONS AND TEAMS

As a beginning in the transformation process, twenty-five electric delivery wagons of 850 pounds capacity and fitted with closed panel bodies especially designed for the Piercy company and of attractive appearance, are to be delivered August 15 next on a contract just entered into with the Studebaker Bros. Co., of New York. The importance of this consummation will be better realized when it is understood that this one move will replace with motor wagons the horse-delivery service of more than sixty of the prominent business houses of New York. The closing of the contract simply marks the conclusion of one of the many large deals that the vigorous management of the Studebaker company is known to be negotiating. Among the companies whose delivery work is done under contract by the Piercy company may be mentioned Rogers, Peat & Co., clothiers; Charles Scribner's Sons, publishers; Oppenheim & Collins, women's costumes; Knox, hatter; the American Book Co., and C. E. Peabody & Co., hardware.

Each customer of the Piercy Co. is given an individual service, just as if he maintained his own delivery service, the wagons used for his work differing in style and finish from the others and having his name painted on the sides. The drivers are in livery, when the customer so desires. Yet all of the heavy initial investment and the annoyance incidental to the maintenance of a private delivery service is taken off the shoulders of the customer and assumed by the contracting concern, which, by the magnitude of its business, is enabled to provide the service needed at a less cost than the individual customer could do it, and at the same time to realize a profit on the work. This business has been under development for the last 37 years, and every person connected with it, from the head of the firm down, has had a thoroughly practical experience in delivery work, having at some time actually driven a wagon. Consequently, in adopting the motor vehicle the company has the tremendous advantage of a long experience in and close knowledge of the delivery business, and believes that thus equipped it can make a success where some others have failed with electric vehicles.

It has the full cooperation of the engineering department of the Studebaker Company, which has been engaged for nearly a year in making a careful analysis of the requirements of the business and working out the refinements of detail under which the new system will be put into practice. The mechanical department to be



STUDEBAKER ELECTRIC TRUCK TO REPLACE HORSED VEHICLES installed is to have the benefit of the guidance and instruction of the Studebaker engineers until the Piercy organization is itself fully qualified to handle the charging and care of the batteries and the adjusting and light repairing of the running gears. This may require several years, during which time the battery work is to be in the hands of an expert from the factory. In this way the customers of the company are to be assured of a continuance of satisfactory service and the success of the installation of electric vehicles made certain.

The west half of the Fifteenth street building is to be converted into a garage to accommodate the first twenty-five machines to be received in August. "We will spend several thousand dollars right away making this part of the building into a complete garage for the storage and charging of the automobiles," said H. C. Piercy to a representative of THE COMMERCIAL VEHICLE. "Later on the whole building will be changed over and we will put in more electric wagons and expect also to have a number of 5-ton trucks. The other half of the building will be used for our present horse equipment until we can make the complete change over to motor vehicles. Of course, a business like ours could not be completely changed over at once. There is a large investment represented in the horses and wagons, which we will need time to dispose of without heavy sacrifice. But we think we are making a pretty good start with twenty-five electric wagons, and as fast as we can convince our customers that the motor service is worth 25 to 30 per cent more than the old service we will add more machines.

"Our place here is 125 feet front by 103 feet deep and six stories high, with basement. It has 6-inch concrete floors and large elevators, a 10,000-pound one in front and an 8,000-pound one in the rear. And our place on Cleremont avenue in Brooklyn is very well located for a garage. We will probably use heavy trucks there, but that is a matter to be worked out as we go along; it is a hard thing to tell in advance how delivery work will develop."

The Fifteenth street stable where the offices are located is a comparatively new and very substantial structure, of brick with steel columns, and has 90,000 square feet of floor area. This will afford storage room for nearly 500 electric delivery wagons. The building is already wired for electric lights, and charging boards are to be put in and all the necessary equipment for taking care of the machines and batteries.

The building in Brooklyn can accommodate fifty machines, and it is part of the plan to locate other substations in the Bronx, and on Long Island and in New Jersey to develop a complete system of local deliveries in the outlying districts of the metropolis. It is easy to surmise what this will mean in the way of quick deliveries in the furthest points of Greater New York and the cities across the Hudson river, such as Jersey City and Newark. The effects should be far reaching, as companies that do not avail themselves of the contract-delivery system or do not have their own motor-wagon delivery service will soon find themselves greatly handicapped in competition with rival stores which by this system will be enabled to make deliveries anywhere in these places much quicker, thereby eventually capturing an increasing proportion of the trade.

"Our contracts are made for a year or term of years usually," said Mr. Piercy, "and are based on the territory covered and the amount of work done. We estimate that the electric wagons will do at least 25 or 30 per cent more work than the horses, covering a larger territory in the same time, and so we will make an increase of 25 or 30 per cent in the contracts where we can convince our customers that the service is worth that much. We are putting the estimate low because we believe it is better to under estimate what the machines will do than to over estimate it, as so many have done before. We expect that maintenance will cost more for a motor wagon than for a horse and wagon but do not think the repairs and depreciation will amount to any more. If we find after a while that the cost of operation is less than we figure now, we will reduce our contract prices and give our customers the benefit; in time, I think perhaps we will be able to get the cost of keeping the electrics down to what it costs to keep horses and wagons and then, of course, we can put the contract rate down to the same figure and get rid of all the horses.

"We decided upon electric machines partly because they are so simple to operate that in a few days our drivers can learn to drive them better than they can drive horses. They will be instructed not to touch a thing if the mechanism goes wrong on the street, but to telephone in to the garage for an expert to go out with the emergency wagon and fix it up. If we had to hire expert machinists to run all of our wagons we would have to go out of business."

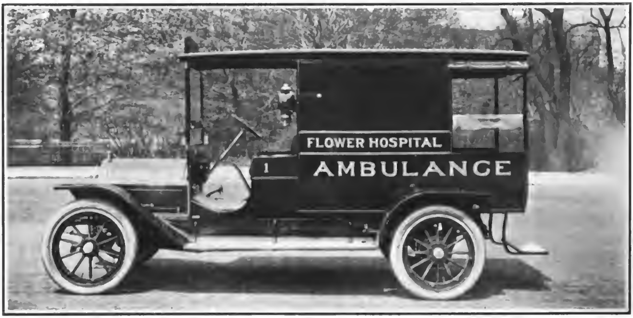
It is evident that the Piercy company has watched the successes and failures of other motor-delivery systems in the city and has studied the possibilities in its own business very carefully before deciding on the momentous step it is taking, which necessarily means a total change in many of the methods by which it has been able to build up a large and successful business. Such a step involves a crucial period of uncertainty through which the business must go until actual experience has settled the various items of cost so that averages can be arrived at to be used as a working basis. That the company itself is willing to assume all of the risk of making this change in the delivery service of half a hundred or more important concerns—for no Studebaker capital is interested in the undertaking, Mr. Piercy declares—indicates pretty clearly that conditions have changed greatly in the conduct of delivery and transfer work and that, more rapidly than most well-informed people suppose, the time is approaching when the horse-drawn wagon will be as great a rarity on the city streets as the horse-drawn street car is now.

MOTOR TRUCKS AND WAGONS for commercial use are almost unknown in Spain. If offers a good market for American machines which are suited to the national conditions and which are less expensive than the vehicles of French make.

CONSUL-GENERAL ROBERT J. WYNNE reports that a statement by the British home secretary shows that there is now one motor omnibus for every two-horse omnibus plying in the streets of London. The full statement of the number of licensed vehicles in London is as follows: Taxicabs, 1,508; hansoms, 5,329; 4-wheeled cabs, 3,768; motor omnibuses, 1,046; horse-drawn omnibuses, 2,281; total, 13,932.

CADILLAC MOTOR AMBULANCES FOR NEW YORK CITY

ONE of the most important of recent developments in the commercial vehicle line is the placing of an order with the Detroit-Cadillac Motor Car Co., of New York City, for twenty Cadillac motor ambulances for use by the New York City hospitals. Four of these have already been finished and two delivered to the Flower Hospital. The general lines and styles of the new vehicles are shown by the accompanying photograph of one of them. Others are to be delivered as specified from time to time by the authorities.



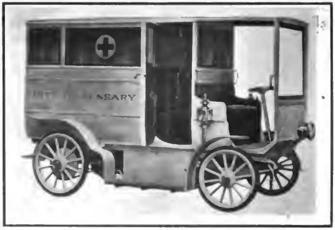
ONE OF THE CADILLAC GAS MOTOR AMBULANCES FOR NEW YORK CITY HOSPITALS

The chasses are the regular Cadillac "30" four-cylinder chassis, merely altered as to length, the frames being lengthened to give a wheelbase 18 inches longer than in the touring car in order to accommodate the standard-size ambulance body. The bodies are made by J. W. Mount, of Red Bank, N. J., and are light, sanitary, attractive in appearance and trimmed with red pantasote without tufting. They have an inside measurement of 6 ft. 2 in. and will accommodate three persons in an emergency. The tire equipment consists of 34 by 4-inch Firestone pneumatic non-skid tires fitted to the new combination quick-detachable and removable or demountable rims. With these rims a damaged tire can either be taken completely off the clincher rim and a fresh one put on in its place, or, if the emergency does not permit of spending so much time, the tire and rim can be taken off together and a fully inflated tire already mounted on its clincher rim substituted for it in less than a minute.

The adoption of these ambulances by the city is largely the result of the work of Dr. D. C. Potter, commissioner of private charities, who, in the interest of humanity, advocated the quicker and more certain transportation of patients by motor vehicle than by the old method of horse-drawn ambulance, and emphasized his arguments with the assertion of greater economy in maintenance, two motor ambulances being able to do the work of four horsed vehicles with a consequent saving over the cost of feeding and caring for the animals. Bids were advertised for publicly and forty-two offers were made by different motor car concerns, the offer of the Detroit-Cadillac Motor Car Co. as made by President Inglis M. Uppercu finally being accepted on the basis of suitability, quality of materials and price, according to Manager C. H. Hill, who says that the machines are furnished under a strong guarantee and that there should be no expense for repairs during the first year except for tires. Before the award of contract was made, the various cars offered were examined by a special board of engineers.

AMBULANCE FOR INDIANAPOLIS

An order recently received from the Indianapolis Board of Health for an up-to-date electric ambulance has been filled by the Waverly Co. with one of the handsomest and most completely equipped power-driven ambulances ever constructed.

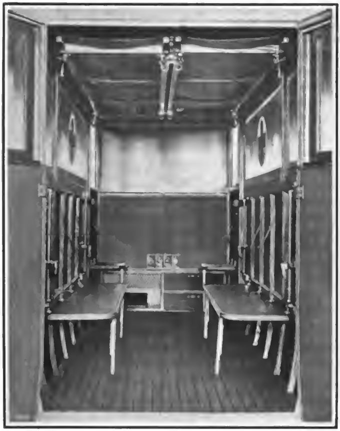


WAVERLY ELECTRIC AMBULANCE FOR INDIANAPOLIS

The dimensions of the new ambulance are as follows: Length, 14 feet 1 inch over all; wheel base, 8 feet 1½ inches; length inside, 8 feet 5 inches; width over all, 5 feet 10 inches; width inside, 3 feet 10 inches; height over all, 8 feet 4 inches; height inside, 5 feet 4 inches; height of sill, 32¾ inches; height of step, 19 inches.

Special points of convenience in this ambulance are the two side doors 23 inches wide opening upon a clear space of 18 inches by 3 feet 10 inches in front of the stretchers for the use of the surgeon and attendants. Convenient to this space are the electric light buttons, the electric heater, the special drawers for surgical instruments, and the appliances for the control of folding seats and stretchers.

The interior is handsomely finished in polished hard woods, with russet leather curtains and upholstery. The exterior is painted in white enamel, with the words "City Dispensary" in blue letters on the side panels. In the glass of the center window on each side is displayed a large red cross on a white circle. The metal surfaces of the lamps, steering wheel, etc., are of polished nickel, heavily plated, while the driver's seat is cushioned and upholstered in russet brown leather.



INTERIOR OF WAVERLY AMBULANCE FOR INDIANAPOLIS

The chassis is of armored wood with motor, battery and steering apparatus attached, and independent of the body. An exceptionally powerful motor has been provided, with large overload capacity, such as is used on commercial vehicles in heavy service. This is operated by a 42-cell 13-plate battery, constructed for unusual mileage and speed, which last varies from three to fifteen miles an hour in ordinary service, with a special emergency speed of twenty miles an hour.

A four-speed controller, so designed as to enable the car to start and accelerate without shock, is an important feature of the equipment, and this with the noiselessness of the motor, driving system and gear, make this new Waverly construction an ideal piece of mechanism, considered either from the point of view of the operator or that of the patient.

AUTOCAR WAGONS IN PHILADELPHIA

The accompanying photograph shows one of the Autocar delivery wagons in the service of Strawbridge & Clothier of Philadelphia. The machines of this type were installed by this large dry goods house after very exhaustive trials and now the suburban service is handled by motor vehicles instead of horse wagons, each machine doing about the same service formerly accomplished with two wagons and six head of horses. The Autocar delivery wagon, which is built by The Autocar Company of Ardmore, Pa., has a load capacity of 2,000 pounds. The motor is of the double-opposed type rated at 18 horse-power and is water cooled. A three-speed progressive change speed gear set is fitted with propeller shaft drive to the rear axle which is of the semi-floating type.

AUTOCAR MOTOR WAGON IN PHILADELPHIA SERVICE

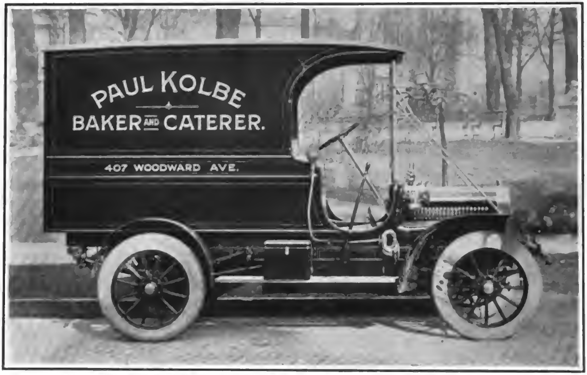
BUICK LIGHT DELIVERY WAGON

Extensive use of touring-car models by owners for general-work vehicles, after the rear seats have been removed, has evidently convinced the Buick Motor Co., of Flint, Mich., of the widespread need of a light, fast machine fitted with open body of limited capacity for light delivery purposes. Consequently, the makers now announce the addition to their line of pleasure cars of the Buick light delivery truck, which has an open-bed body fitted to the Model F touring car chassis. The load space is 4 feet 10 inches long, 3 feet wide, and 7 inches deep. The body is low, standing only 30 inches above the ground, making it particularly handy for loading and unloading groceries, meats, hardware, and a great variety of merchandise. As the machine is fitted with 30 by 4-inch pneumatic tires, the load rides easily, even when the machine is driven rapidly. Mud fenders, made continuous with ample running boards, keep the body clean on muddy roads, and a tilting steering column enables the driver to enter and leave his seat easily.

The frame is of angle iron, and the springs three-quarter elliptic in front and full elliptic in the rear. The wheelbase is short—only 92 inches—enabling the car to work its way speedily through congested traffic and to turn in narrow streets. The prime mover is a two-cylinder opposed engine, with 4 1-2 by 5-inch cylinders, provided with a Schebler carbureter, geared water circulation pump, jump-spark ignition, with storage battery and set of dry cells, and mechanical force-feed oiler. A very strong planetary change-speed gearset is used, provided with a self-adjusting clutch. Final drive is by center chain. The gasoline tank holds 15 gallons, sufficient for 150 miles or more. At the time of going to press no illustration of the machine is available.

CARTERCAR FRICTION DRIVEN DELIVERY WAGON

ONE of the "simplest" vehicles of the delivery wagon type is built by the Cartercar Company of Pontiac, Mich. A Cartercar delivery wagon in the service of a Detroit house is shown in the accompanying illustration. This is fitted with a double-opposed motor of 5½-inch bore and 4½-inch stroke developing 22-24 horsepower. This type of motor is compact, economical in fuel consumption, and its construction practically eliminates all unpleasant vibrations which are usual in two-cylinder motors of the vertical type. Cooling is by "natural" water circulation so that any form of water pump is unnecessary. The change-speed mechanism is of the friction type, the driving disc of aluminum being carried on a prolongation of the engine shaft, in the rear of the flywheel. Against this aluminum disc a sliding friction wheel is brought into contact. The driven wheel is mounted so as to be freely slid across the face of the driving disc, making contact at different points progressively from the outer edge to the center of the disc, giving a wide range of speeds in both the forward and reverse directions. The final drive is by chain and sprockets, from the countershaft on which the driven friction wheel is mounted, to the rear live axle.



CARTERCAR GAS-MOTOR FRICTION-DRIVEN DELIVERY WAGON USED BY DETROIT HOUSE

A very important and up-to-date feature of construction is the chain case, which completely encloses the driving chain permitting it to run in a lubricant and excluding all dirt and abrasive substances which might otherwise be picked up during the passage of the vehicle over the roads. The use of the friction drive very much simplifies the driver's control, as all changes of speed from zero up to maximum in either direction can be made simply by the movement of a single lever. The contact of the friction wheels is controlled by the left-foot pedal, and the right-foot pedal connects with the braking system on the rear-wheel hubs.

It is practically impossible for a careless operator to damage the transmission mechanism of this wagon owing to the absence of toothed wheels in the change-speed mechanism. If it becomes necessary to renew the fiber rim of the driven disc this can easily be accomplished at small expense; it has been found in practice that a rim is good for at least 4,000 vehicle miles. Owing to the absence of toothed gears in the change-speed mechanism, and the encasement of the driving chain in a dust-proof container, and also to the type of motor employed, this wagon is extremely noiseless in operation. It is built also with open body as a stock type. Special bodies can, of course, be built to order.

NEW CAB COMPANY PROPOSES LOW RATES

ANNOUNCEMENT was made about the middle of May of the plans of a new company called the Metropolitan Taxicab Co., of New York, to start a new service with a schedule of rates nearly 50 per cent lower than the rates that now prevail in the city.

An office of the company has been opened in Room 1210, No. 302 Broadway, and when seen there a spokesman for the company told of the plans to a representative of THE COMMERCIAL VEHICLE. One hundred new cabs, he said, had been ordered, and deliveries were to be made by June 1, when it was expected between 50 and 100 would be ready for operation. The chasses were being built in Chicago by a large established motor car concern, and the bodies were being built in another plant from designs furnished by the cab company. The cabs are to be painted a grayish white and will be operated from the left side.

The garage on West Sixtieth street, near Eighth avenue, formerly occupied by the New York Taxicab Co., whose lease expired May 1, has been leased by the Metropolitan Taxicab Co for its central station.

An important feature of the plans whereby it is hoped to maintain a more efficient service than is now provided, and at only half the present rates, consists in maintaining cab stands at distances of not more than two miles apart all the way from Fulton street to One Hundred and Twenty-fifth street in Harlem. Upon receipt of a call by telephone, which will always be received at the central station, the order will be transmitted to the stand nearest the place of call, which will be within a mile. When at the end of its journey the cab has been dismissed it will report to the nearest stand instead of returning to the stand from which it departed, thus following the regulations that govern the movements of cabs in London, where rates are much lower than in New York. In this way it is hoped to eliminate a large percentage of the "dead" mileage, which has been the subject of complaint by other operating companies, whose initial charge for the first half mile has been placed at 50 cents to cover part of the trip of the empty cab, and which have made a charge of one-half the mile rate for returning empty after dismissal above One Hundred and Fifty-fifth street or outside of Manhattan Island.

The first stands will be located in Fulton, Desbrosses, Twenty-third, Thirty-fourth, Forty-second, Sixtieth, Ninetieth and One Hundred and Twenty-fifth streets.

The schedule of fares to be charged provides for a rate of 20 cents for the first half mile and 15 cents for each succeeding half mile, as compared with an initial charge of 50 cents for the first half mile and 10 cents for each successive quarter mile now charged by other companies. And there are to be no "extras." Trunks will be carried without charge and no charge will be made for going empty to the place of call or for returning after dismissal.

Should it be found, after a fair trial, that the service cannot be operated profitably at these rates, it is said, the schedule will of necessity be raised; but the men in the company are said to have had experience in the operation of automobiles, and feel competent to calculate the costs of the proposed service. The company was incorporated in March last, with authorized capital stock of $200,000. The officers are: President, Philip Daab, of Hoboken, N. J.; Vice-President, Edwin Knust, of Union Hill, N. J.; Treasurer, F. S. Thomas, of Chicago, and Secretary, E. S. Drinkwater, of New York City. Frederick Wellman is manager.

An interesting departure is the equipment of the cabs with a new taximeter of the company's own design, in which the clock and the shaft drive mechanisms are entirely separate and distinct, although combined in one instrument. Each has its own flag, and when the cab is engaged only for a given trip without stops the flag of the distance meter alone is turned down and the passenger has only one dial to consult. Should the cab be stopped and required to wait, the time flag is turned down, starting the clock. If, upon re-starting, this flag is not turned up again a bell will ring and continue ringing until the clock is stopped. There are only two dials, both circular, and the one for distance being directly above the time dial. There is no dial for extras. The figures are nearly three-quarters of an inch high, so that they can be read easily.

It is believed by the officers of the company that this instrument affords no opportunity for the driver to "knock down" fares, as a bell will ring if the cab is started with its passenger before the flag is turned down. By means of a card system a careful check is to be kept on the mileage covered by the machines. When a cab leaves a stand to answer a call the odometer will be read and the record entered on a card at the dispatching station, and when the same cab reports to some other stand after discharging its passenger the agent at that station will make a card entry of the odometer reading. These cards will be turned in to the main office at the end of the day and the records for the different cabs checked up with the fares turned in by the drivers. Thus, if any discrepancy occurs it can be discovered quickly.

One of the economies to be effected, and which will enable the company in part to maintain its low schedule will be that instead of paying high prices for cab stands and privileges at the hotels, restaurants, ferries, and so on, sometimes amounting to $200 or $300 a month, the sub-stations will be located in public office buildings, where a booth with telephone will be installed and the cabs permitted to stand in front of the building. The charge for the booth privilege will be only nominal.

By having stands well distributed throughout the city it will be possible to dispatch a cab from the stand nearest the place of call so that it will reach that point within five minutes, instead of having to make a run perhaps of several miles from the central station. This feature, combined with the proposed low rates and an advertising campaign which is to be conducted by the company, will, it is believed, quickly secure patrons enough to keep all of the new cabs busy during a major part of the time and additional cabs will be put on only as the growth of the business warrants. There is no intention of allowing a large percentage of idle cabs to eat up profits made by the service of the employed vehicles.

METROPOLITAN CAB MANAGEMENT

A man who had just returned to New York, after an absence in Australia of ten years, was seated at the window of a Fifth avenue club. He had been asked what new thing had most impressed him, and without hesitation answered, "the automobiles." He pointed to the avenue filled from curb to curb with the afternoon traffic, and continued, "The last time I sat in this window an automobile was a novelty that would cause every head in the hurrying crowds to turn. I've been counting out of curiosity and to-day nearly two-thirds of all vehicles are motor cars. Ten years ago we thought our grandchildren might perhaps see the horseless age; to-day it's safe prophecy that the man who sits here in 1919 will see the crowd turning to stare at the last of the horses."

We who have seen the change take place, says a writer in the souvenir program of the seventh annual ball of the New York Transportation Association, gradually hardly realize how great it has been and the important place the automobile occupies in the daily life of the people. And the taxicabs are the most interesting of all the automobiles. They are in the public service and have the interest which attaches to anything in which all the people have a share. They are so cheap that even the poorest may use them sometimes, while their excellence appeals to the richest and most exacting.

OWNERSHIP OF MOTOR CABS

Most of the motor cabs now operating for hire on the streets of New York—upward of one thousand in number—have made their appearance within a year; more than half of them are the property of the two principal companies; there are upward of a score of smaller companies operating from six to fifty or more cabs each and several hundred independent cab-owners, driving their own cabs, many of them ex-horse-cab drivers, who are now earning a good living with the more modern motor driven public conveyances.

The men who are identified with the New York Transportation Company are justly proud that it is the father of the motor cab business. For eleven years it has been preparing the field. Its first vehicles were crude and clumsy and cost more to operate than they could earn, but even then the foundation was being laid for the reputation for good service which is now enjoyed.

Improvements in vehicles, batteries and tires and an elaborate plant for handling the equipment reduced the cost of operation sufficiently to yield a small margin of profit, but the enormous outlay involved in such an establishment made motor cab enterprises unattractive to capital until the advent of the gasoline cab. With its greater speed, unlimited radius of action and consequently greater earning power, the gasoline cab requires a much smaller initial investment than the electric vehicle, which it is displacing, and it is this feature more than any other which has brought about the great increase in the motor cab business. Unfortunately, unscrupulous promoters are taking advantage of it to foist their "get-rich-quick" enterprises upon a gullible public, the taxicab having for the time, on tales of its 113 per cent. profit, replaced the gold mine, the oil "gusher" and wireless telegraphy in extracting subscriptions from the class of investors known as "easy marks." There will be many a sadder and wiser investor in such schemes in New York a year from now.

MORE CABS, MORE BUSINESS

After being alone in furnishing motor cab service for so many years the New York Transportation Company now has plenty of company and is glad of it. Within reasonable limits, which have by no means been reached, the more well conducted and maintained motor cabs there are on the streets of New York the more business there will be for each of them. There has been an increased amount of cab riding in the last year because a few thousand people have suddenly learned that money spent in cab fares buys more comfort and pleasure than if invested in flowers, expensive suppers or the like. There are still hundreds of thousands who can be taught the same lesson.

But if good service breeds business it is equally true that bad service kills it. The taxicab driver or owner who treats a patron badly is the worst enemy the cab business can have. Dirty cabs, discourteous, careless or inexperienced drivers, unreliable, inaccurate taximeters and charges in excess of the published tariff, are a few of the things which injure not only the particular cabs on which they are permitted, but, in a lesser degree, the business of all other cabs as well.

The New York Transportation Company has the great advantage over its competitors that in its many years of operation it has learned many valuable lessons peculiar to the motor cab business. Its vehicles and taximeters are selected by experts familiar with the conditions to be met, and they are cared for in shops more extensive and complete than those of many manufacturers. Its employees are subject to discipline which, while it may at times seem severe, is, in reality, a protection for the majority of the men against the few who would take advantage of a less strict rule. All have the reward which comes from public recognition of work well done.

CAPABLE DRIVERS NECESSARY

The very nature of cab operation and its relation to the general public calls for men of good character, active minds and all-around ability. Particularly is this true of the drivers, who alone come into constant personal touch with the patrons; with them in a large measure lies the responsibility for the creation of whatever impression the service makes on the mind of the passenger.

The New York Transportation Company is justly proud of the reputation its service enjoys and of the drivers who have had so large a share in creating it. From the earliest days of its existence the company has realized the importance of the man on the driver's seat and has given its best endeavors to the selection and training of its corps of operators and to efforts to make the conditions under which their work is done as attractive as is possible. The things which add to the good reputation of the service are care and skill in handling the vehicle, attentive and intelligent execution of instructions, courtesy to passengers, gentlemanly behavior at all times, and neatness in personal appearance. To the drivers of the New York Transportation Company and others like them is due the credit for proving that a cab driver may and should be a self-respecting gentleman.

The driver's seat is not a bed of roses; his duties expose him to every attack of the elements—rain, snow, the biting cold of winter and the heat of midsummer. Hardly less trying is his exposure to the criticism, complaint and abuse so often meted out to him with little or no provocation by his patrons. But the greater the trial, whether of his physical endurance or of his temper, patience and courtesy when unjustly attacked, the greater is the credit if he justifies by his adherence to the standard set for him the trust imposed by his employment.

TAXICABS IN ONE-GALLON FUEL TEST

Because the cost of operation is an essential element in the economical conduct of a taxicab service, it is of particular interest to "get a line" on the actual per mile consumption of gasoline required for the running of these machines. Under the circumstances, it might have been expected that more than three taxicabs would have started in the one-gallon gasoline test held on Friday, May 7, as the closing event of the second annual New York automobile carnival.

STARTING A TAXICAB FROM THE A. C. A. CLUBHOUSE IN THE ONE-GALLON CONTEST

The twenty cars that started were divided into six classes, according to price and power, except that in the special class for taxicabs no account was taken of horsepower and selling price. Each vehicle in the contest was weighed empty and when filled with passengers, its tanks entirely emptied of gasoline and then partially filled with exactly one gallon of fuel. The start was made from the Automobile Club of America clubhouse on West Fifty-fourth street and the route was over the Queensborough or Fifty-ninth street bridge and through Woodside, Flushing, Bayside, Manhasset, Jericho, Hicksville and Freeport, returning to the clubhouse through Rockville Center, Springfield and Jamaica, all on Long Island.

The score by which the awards of prizes were made was based on ton-mile performances instead of, as heretofore in similar contests, on distance traveled alone. It was recognized in promoting the contest that the car which carried the largest load the greatest distance on the one gallon should properly be declared the winner.

The three competing taxicabs were Thomas (American) and two De Dions (French), all having four-cylinder engines. The Thomas is rated at 16-20 horsepower and the De Dions at 12. The best score was made by the American machine, which carried four passengers a distance of 22.7 miles on its one gallon of fuel, securing an official score of 76.839 pound-miles, or 38.42 ton-miles. The weight empty was 2,730 pounds, and with passengers aboard, 3,385 pounds. The elapsed running time was 1 hour 41 minutes.

One of the foreign machines with five passengers aboard made the next best score in the taxicab class, of 55,620 pound-miles, or 27.81 ton-miles. It weighed 2,460 pounds empty and 3,090 pounds with passengers. It ran out of fuel and stopped at exactly 18 miles, which it covered in 1 hour 19 minutes.

The other De Dion carried only four passengers and ran 17.8 miles in 1 hour 26 minutes, making a score of 54,290 pound-miles, or 27.15 ton-miles.

Only eight cars out of the entire twenty in the test made a better score than the Thomas cab, the winner in each of the other classes, except that for cars selling from $2,000 to $3,000 in which there was only one car, surpassing its score.

CHICAGO CAB MERGER EFFECTED

Leading organizers and stockholders in the New York Taxicab Co. succeeded in bringing about on May 1 a consolidation of four of the principal motor cab companies of Chicago. The business of the consolidated companies is being conducted under the name of the Chicago Taxicab Co., with $2,000,000 capital, of which W. W. Tracy, of the banking firm of Tracy & Co., which financed the deal, was made temporary president. Other stockholders, some of whom are also stockholders in the New York Taxicab Co., are W. C. Brown, president of the New York Central Railroad; Fred W. Upham, president of the City Fuel Co., of Chicago; John R. Thompson, county treasurer of Cook County; E. T. Glennon, Adam Ortseifen and Jacob L. Kesner.

The consolidation was engineered by Alderman A. B. McCoid, of Chicago, after negotiating for six months, and embraces the business of the Kenwood Taxicab Co., owned by Mr. McCoid, who is secretary of the combination; the Dan Canary Taxicab Co., the cab department of the C. A. Coey Automobile Co. and a fourth company whose name is held back until after June 1 when its business will be taken over. The Coey company's business was transferred on May 15. The new company, which claims already to control 65 per cent. of the taxicab business of Chicago, is negotiating with other companies and expects to acquire 200 additional cabs within a few months, and to make contracts for the livery business of all the leading hotels, depots, restaurants and theaters.

Incorporation papers were originally secured last October, with a nominal authorized capital stock of $5,000, which has increased to $2,000,000 by a certificate filed on May 1.

Temporary headquarters are located in the Dan Canary Co. garage on Michigan avenue, but it is the intention of the company to erect four large new garages, one in Michigan avenue, near Hubbard place facing Grant Park on the lake front, and one each on the South, West and North sides.

According to Mr. McCoid, the company does not propose to raise the passenger rates but, on the contrary, will probably reduce them as operating economies made possible by the combination render it possible to do so profitably. The taxicab service of the city generally will be improved, he said.

TAXICABS FOR FUNERALS

Without doubt taxicabs will in a short time be used rather extensively at funerals. The opening wedges have already been driven. F. F. Roberts, a Chicago undertaker, recently conducted a funeral in which the hearse and all the vehicles were motor propelled. The cortege consisted of a White steam hearse, especially built for the undertaker, a limousine and several touring cars. The charge for the hearse for the occasion was $75 as compared with $50 for a horse-drawn hearse.

With the establishment of cemeteries farther and farther from the heart of large cities, practically an entire day is consumed in driving to the cemetery and returning, whereas, with the use of motor cars, the funeral conducted by Mr. Roberts traversed the 11 miles to the grave in a dignified and appropriate manner in one hour and returned in 40 minutes.

Motor funeral wagons or hearses are, in fact, now used by half a dozen or more undertakers in America, and within the past month the Auto Funeral Car Co. was incorporated in Cleveland, Ohio, for the manufacture and sale of a type of funeral vehicle invented by J. W. Butler, F. R. Briggs and E. H. Clark, all of Cleveland. The vehicle is to be very large and built on the lines of a limousine, with a partition dividing it into two compartments and so arranged that it can be converted into a small chapel in which services at the grave can be held in bad weather without exposing the mourners to the rain or cold.

The first taxicab funeral occurred in Philadelphia last month, when a number of taxicab drivers attended the funeral of one of their companion drivers, William G. Adams, who was killed in a collision with a locomotive. Twenty taxicabs were lined up in front of the chauffeur's home in South Seventeenth street, and brother chauffeurs acted as pall bearers. Officers of the Chauffeurs' Union also attended.

HOW TAXICAB WORK GROWS

An interesting and instructive instance of the possibilities in the taxicab field for the enterprising motor car manufacturer who can see the advantages of taking orders direct in quantities of from a dozen to fifty or more, is afforded by the case of the Atlas Motor Car Co., of Springfield, Mass.

Two years ago this company had not produced a single taxicab, and probably had not given the matter more than passing thought. Then, in response to a demand, it brought out its new taxicab model which was given a long trial in actual service by the New York Transportation Co., doing the same work as the imported Delahaye cabs operated by that company. As a result of this test, a contract for fifty of the cabs was given by the New York Transportation Co. Now, less than a year later, Atlas cabs are being used by more than twenty companies. In New York alone they are used by the following: New York Transportation Co., Motor Transportation Co., Keaton Taxicar & Garage Co., New York Livery & Auto Co., Haff Motor Vehicle Co., Dakota Stable Co., Hoyt & De Mallie, Colonial Garage, Alonzo Nodine's Sons, R. Taggart, Jr., C. B. Skelton and F. C. Smith.

One of the most recent orders filled was for fourteen cabs shipped in April to the Phillips Automobile Co., of St. Louis, making twenty Atlas cabs now in use by that company, with more to follow.

The 1909 Atlas taxicab has the two-cylinder, two-cycle, 20-horsepower engine equipped with improved Atwater-Kent ignition system; improved sight-feed Hancock oiler, gear driven instead of belt driven; improved carbureter with gasoline adjustment on dash; pump circulation instead of thermo-syphon, which eliminates all possibility of overheating the engine under the most severe conditions, and gear-driven fan, which makes it possible to run the engine at highest speed when the car is standing still without any steaming of the water. A high-grade steel frame is used, which is narrowed 3 inches in front to allow maximum cramp of the front wheels and add greatly to the appearance.

ATLAS TAXICAB AT SAINT LOUIS HOTEL

FIAT CABS FOR PACIFIC COAST

Although the Fiat taxicab has been on the market for some time the New York establishment handling this Italian machine has hitherto been unable to secure deliveries in sufficient quantities to fill orders for public service machines. Now, however, we are informed arrangements have been completed for more extensive shipments of cabs so that, for example, in the case of the Oregon Taxicab Company, of Portland, Ore., a recent order for twelve machines is being promptly filled. A number of cabs of this shipment is shown in the accompanying photograph of the vehicles lined up outside the premises of the Fiat Automobile Company, in New York. They were especially attractive; fitted with handsome bodies, painted clear Havana brown, with yellow frame and running gear. The interior finish was equally attractive, the upholstery being of dark colored calf leather up to the level of the windows and above that a rich Havana brown broadcloth, with imported lace trimmings and curtains of silk of same quality as used in cars for private use.

FIAT TAXICABS LINED UP OUTSIDE NEW YORK AGENCY READY FOR SHIPMENT WEST

Cabs built in the Fiat Works at Turin, Italy, are now in operation in nearly every civilized country in the world, including South America, Europe, Asia and North America. The London Motor Cab Company purchased 500 of these vehicles about eighteen months ago, and recently placed a second order for 500 of the same make.

TENNESSEE NOW IN LINE

Almost simultaneonly the news comes that Nashville and Chattanooga are to have taxicab services like the rest of the progressive cities of the country.

The Nashville Taxicab Co. has been organized with $30,000 capital stock and will be ready for business as soon as it can get delivery of the French cabs that have been ordered. A sufficient number will be put in service to meet the demands of the public and additional machines will be added as the demand increases. Incorporators of the company are: Maj. E. C. Lewis, D. S. Williams, George E. Bennie, Banks Bennie, James S. Frazer, George A. Frazer and Henry S. Frazer. The officers are: James S. Frazer, president and general manager, and Banks Bennie, secretary and treasurer.

In Chattanooga a service is to be started about June 1 by the Chattanooga Taxicab Co., recently incorporated with $10,000 capital by J. H. Buchholz, Sidney A. Webb, C. C. Nottingham, George D. Lancaster and R. S. Faxon, all of Chattanooga. Sidney Webb will be manager. The cabs are to be stored in half of the building occupied by the Burk Automobile Co., at Eighth and Chestnut streets. Four cabs have been bought and two more engaged, and if the business justifies, more will be put on later in the summer.

PUBLIC STAND ON PRIVATE PROPERTY

In an interesting decision handed down in Washington last month by Chief Justice Shepard of the Court of Appeals of the District of Columbia, the space occupied by taxicabs at the Union Railroad Station is held to be a public stand, although it is the private property of the Washington Terminal Co., and the cabs which have the exclusive privilege of occupying the stand are subject to the same tax or license as other cabs occupying public stands for hire.

The case came up from the police court, where the taxicab company was charged with operating cabs for hire without a proper license. The taxicab company maintained that, as it had paid for a license to maintain a garage and did not keep cabs at any of the designated public cab stands, it was not subject to taxation on the vehicles kept in the hired private space at the Union station.

In overruling this contention, the court said:

> "We are of the opinion that the space occupied by the taxicab company on the grounds and within the building of the Terminal Company is a public stand within the meaning and scope of the proviso. It is true that space is the private property of the Terminal Company, which it is not bound to open to general public use, and it had the right to contract for its exclusive use by the taxicab company, to subserve the convenience and comfort of passengers arriving in and departing from the railroad station It had the power to maintain the space as a stand for those particular carriages only in the exercise of its public calling and as an aid to the performance of its public duties, which thereby became affected with a public use, subject only to the right indicated. By its uses it became a public place, notwithstanding the limitations upon other uses. The taxicab company, licensed to keep carriages for hire at a particular establishment only, kept its carriages standing in this space for hackney and not livery service; and from there it not only served railway passengers, but also, as shown by the evidence in this case, other persons than arriving and departing railway passengers."

MINOR TAXICAB NEWS

The manufacture of electric taxicabs is to be begun in Cleveland, Ohio, by the Cleveland Electric Vehicle Co., an offshoot of the Cuyahoga Motor Car Co., organized with $300,000 capital stock, which is held by some of the most prominent business men of Cleveland. A new battery invented by the Smith brothers, who are members of the new company, is to be used in the machines. Francis J. Wallace, formerly of New York, who organized the first taxicab company in Cleveland, is to be sales manager of the company.

A departure in taxicab practice has been made by R. D & C. O. Britton, who operate a service in Hartford, Conn., with Maxwell taxicabs. In addition to the usual mileage rates, which correspond to similar rates in other cities, they have announced special prices for round trips to neighboring cities, as follows: Windsor, $4; Windsor Locks, $5; Thompsonville, $10; Springfield, Mass., $15; Bloomfield, $4; Tariffville, $6; Sinsbury, $10; New Hartford, $10; Winsted, $20; Norfolk, $25; Canaan, $30; Torrington, $20; Thomaston, $15; Waterbury, $20; New Britain, $5; Meriden, $12; Plainville, $8; Southington, $10; Cheshire, $15; New Haven, $20; Bridgeport, $35; Manchester, $5; Rockville, $8; Stafford, $15; Willimantic, $15; Middletown, $10; Cromwell, $8; Norwich $25; Saybrook, $25; New London, $35; Durham, $12; Glastonbury, $4; and South Glastonbury, $6.

The Bergdoll Motor Company, at 323 North Broad street, Philadelphia, which started a motor cab service in that city last summer, has announced that it is having 150 additional cabs built in the Bergdoll shops where the first ones were made. During the winter months the passenger business grew rapidly on account largely of theater trade. Speaking of the subject, Louis J. Bergdoll said there was no question about the popularity of the taxicab, and that his company had found it necessary to increase its capacity quickly in order to answer the hundreds of calls received daily.

An order for the construction of fifty new cabs has been given by the Pennsylvania Taximeter Cab Company, 1407 Locust street, Philadelphia, which has the exclusive privilege of the Bellevue-Stratford garage. About 400 calls a day are received by the company and at times not more than 25 per cent of the orders can be filled. J. C. Hinkle is president and general manager.

The Taxicab Service Company, of Detroit, has received four new Chalmers-Detroit cars with yellow bonnets for its service, which now comprises nine cabs. The company has moved into the new Regal garage on Woodward avenue, above Alexandrine street, which it will occupy temporarily until permanent quarters can be secured.

A taxicab company is reported to have been formed in Birmingham, Ala., and to have ordered eight or ten cabs to be delivered at once. Local capital is interested in the undertaking.

Harry N. Allen, formerly president of the New York Taxicab Company, is said to be the promoter of a new company in New York to start a cab service to operate under the old rate of 30 cents for the first half mile. Two prominent railroad men are said to be large stockholders, but their identity is concealed for the present. Mr. Allen is to be president and general manager.

Possibilities of the taxicab were well exemplified in a novel way in England recently by an American playwright, Charles Klein, who returned in May from a month's trip abroad. Having but a short time in which to see the British Isles, he arranged in London for the services of a taxicab and its driver, and starting from the Strand, ordered the chauffeur to drive him to Edinburgh, Scotland. From there he went to Glasgow, and crossed on a steamer to Londonderry, whence he was driven to Queenstown, where he sailed for home. The trip consumed five days, and the taxicab fare amounted to about $300.

Even South Africa has its taxicab service now, according to the report of American Consul Gemsaulus at Johannesburg, and the opposition of 600 horse cab owners has failed to stop the new service.

The Union Transfer Company in Huntington, W. Va., has bought two real taxicabs—not mere automobiles with taximeters attached—for public service in that city.

NEW YORK MOTOR MAIL SERVICE

A contract has just been awarded by the Post Office Department for a great extension of the motor wagon mail service in New York as furnished by the Motor Delivery Co. and described at length in THE COMMERCIAL VEHICLE for May. The new contract covers the transfer of all except first class mail matter between branch stations in Manhattan above Forty-second street.

Beginning July 1 fourteen new electric trucks will be put in the service, performing the same kind of work as the four machines that are now carrying all classes of mail on a half-hourly schedule between the College Station on One Hundred and Fortieth street near Eighth avenue and Station M and the Washington Bridge station on Amsterdam avenue.

The new contract covers the period from July 1, 1909, to June 30, 1913. There were two bidders, but the contract was awarded to the Motor Delivery Company, of which C. H. Bardwell is president, at $44,850 per year. This is the largest contract of this nature the postal authorities have ever awarded. It is estimated that 1,000,000 pounds of mail matter are handled in New York every day.

The wagons now used and those to be put on for the new service are General Vehicle Co. electric trucks. They will be of 1,000, 2,000 and 4,000 pounds capacity. Those used on Washington Heights now are of the smallest size but are commonly loaded with 1,500 pounds. These and other machines of the Motor Delivery Co. are being stored temporarily in the St. Nicholas Avenue Garage pending the completion of a new garage which the company is having built for its own uses at 3 and 5 Lawrence street.

COMMERCIAL VEHICLES IN OPEN CONTEST

An Autocar motor wagon, a taxicab of the same make and a Commercial Motor Truck Co. electric delivery wagon took part in the "roadability" contest of the Quaker City Automobile Club on April 24. The run was from Philadelphia to Atlantic City, a distance of 68.2 miles. There were sixty-nine entries, including gasoline, steam and electric vehicles, and of these sixty-five completed the run officially. The official secret time limit set for the run was 3 hours 46 minutes 30 seconds, and prizes were awarded in accordance with a score based on the number of hours, minutes and seconds the cars deviated from this time.

The Autocar wagon took seventeenth place, exceeding the time by 6 minutes 15 seconds. The Autocar taxicab was given thirty-ninth place, having exceeded the time by 20 minutes 10 seconds, and the Commercial Truck Co.'s electric delivery wagon reported at 8 o'clock at night.

This wagon is of a new type, having shaft drive and Hindley spiral gear drive to the rear axle, the gears running in oil in a case made in unit construction with the rear axle.

PASSENGER SERVICE IN PITTSBURGH

When the Pittsburgh Railways Company's officials came down to their offices Monday morning, May 10, they found that a new rival had started in to capture their South Side nickels. It is known as the Wintersgill Motor Company, and is in business in Pittsburgh to-day simply because the Pittsburgh Railways Company would not grant the request of hundreds of residents on Duquesne Heights and Mt. Washington who wished the company to continue the old-time custom of issuing transfers from the foot of the Duquesne Incline Plane to the Pittsburgh Railway lines on West Carson street. This refusal was made January 1 to the Duquesne Heights and Mt. Washington Boards of Trade, who used their utmost efforts with the railways company to get the transfers reinstated. Failing in this they set about to get some further method of transporting the big communities on the Heights to the business section of Pittsburgh and also to adjacent boroughs along the Monongahela River, where many of the inhabitants work.

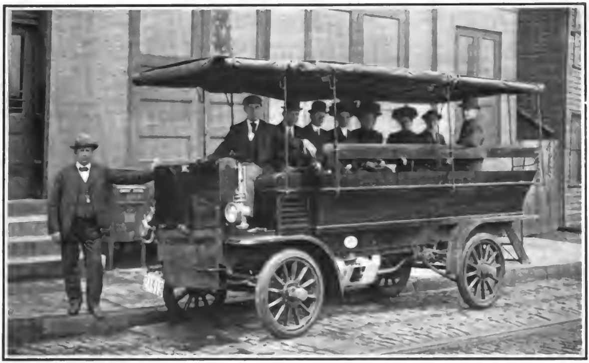
Elmer E. Wintersgill, who came up from Florida to manage this operation, is an experienced transportation man. He has a contract with the Duquesne Incline Plane Company to carry its passengers and accept transfers. The new line of 'buses starts from Liberty avenue and Fifth street and runs straight to the Monongahela River, thence over the Point Bridge to West Carson street and the incline. Its schedule is five minutes, or one minute shorter than that of the railways company. The cars will run from 6 o'clock in the morning until midnight, and a fare of 5 cents, including transfers to the incline, will be asked. The three cars in service were ordered from the Rapid Motor Vehicle Company of Pontiac, Mich. They are of the wagonette type, 30 horsepower, and seat 22 people, the seats being arranged lengthwise in the car. Each car is provided with electric lights and all necessary weather protection. This is the first time that a definite arrangement has been made by any auto transportation company to rival the service of the Pittsburg Railways Company, although auto 'bus lines for pleasure and sightseeing purposes have been operated in the city for several years. LANE.

ORGANIZED TO BUILD TRUCKS

Architects have prepared plans for a large new industrial plant to be erected at Koppel, Beaver County, Pa., for the manufacture of commercial motor vehicles of all descriptions by the Pittsburg Motor Truck Co., recently incorporated at Dover, Del., with authorized capital stock of $100,000. The construction of the plant is to be rushed with all possible speed during the coming summer in order to have it in full operation early next fall. Negotiations for the site were closed the second week in May.

As a beginning, the new company has taken over the property of a plant located at Ithaca, N. Y., which is engaged in the manufacture of motor trucks. This is to be removed to Koppel and greatly enlarged. When in full operation the new industry, it is said, will employ several hundred workmen. Delivery wagons are to be made a specialty.

Pittsburg capitalists are principally interested in the enterprise, C. C. Congle, of that city, having taken a prominent part in the organization of the motor truck company. Other incorporators are M. E. Smith and P. C. Benedict.



PUBLIC PASSENGER SERVICE OPERATED WITH RAPID MOTOR VEHICLES IN PITTSBURG, PA.

The Commercial Vehicle

Vol. IV June 1909 No. 6

Published Monthly by The Commercial Vehicle, Incorporated, at
1402 Broadway, New York City

Cable Address
Comveh, New York

Long Distance Telephone,
425 38th Street, New York

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Chicago, Ill.

Subscription Rates

United States, Canada and Mexico . . . . One Year $2.00
Other Countries in Postal Union . . . . One Year $3.00

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Changes in copy or in orders for advertisements for the month following must reach us not later than the 15th of the current month when proof is to be submitted, and not later than the 20th when no proof is required.

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Entered as second-class matter, September 13, 1906, at the post office, New York, N. Y., under the Act of Congress of March 3, 1879.

AN INDEX OF POSSIBILITIES

According to the statistics of the Census Bureau, more than 1,700,000 horse-drawn vehicles were built in the United States during the year 1905. Of this grand total, 133,000 were business wagons, not including farm wagons, and 769,000 were ordinary two-passenger four-wheeled buggies. Basing his calculations on the expectation of a very large and growing annual production of motor runabouts to sell at $500 or less to take the place of the horsed buggy, Benjamin Briscoe makes the prediction that in ten years horses for purely business purposes will be as rare as motor vehicles were ten years ago.

If there is a steady annual market for 133,000 business wagons, exclusive of farm wagons, it is evident that there will always be a large market for motor delivery wagons and motor trucks, provided they can compete in selling price with a horse and wagon outfit or that the original cost is low enough to admit of the majority of horse users availing themselves of the superior efficiency and economy of the self-propelled vehicle.

But the great impulse in the commercial vehicle field will come, not from filling the regular demand due to wearing out and breakage of horsed vehicles in use and to increase of population and industrial enterprises, but to the displacement of horsed outfits and the substitution of motor wagons therefor in enormous numbers. In a degree, it will be a repetition of the revolution in street car operation due to the advent of the electric car. Express companies, department and dry goods stores, transfer companies, manufacturing establishments, municipal fire, police and other departments and innumerable retail stores having more work to do than one or two single-horse wagons can take care of, will within the coming five years dispose of their horses and wagons and adopt the commercial motor vehicle in its multitudinous types at prices ranging from $500 upwards.

Truck and delivery wagon manufacturers will then awake to the realization that they are confronted with the task of supplying not merely a part of the regular annual demand for business vehicles, but the tremendous undertaking of replacing within the span of a decade a very large proportion of the unnumbered horsed wagons and special vehicles that are now in use, doubtless running well over the 1,000,000 mark.

Inasmuch as farm wagons are not included in the census figures quoted, it is impossible even to guess at the proportionate number or the total in use, but it must be very large. And there is every reason for believing that farmers will be among the most liberal buyers of motor wagons, just as they are to-day buying approximately one-fourth of the pleasure cars manufactured. They are growing more and more quick to appreciate the advantages of time and labor saving machinery, such as gas engines of the stationary and portable types for power purposes and traction engines for heavy plowing, reaping and threshing. Doubtless motor wagons built on the general lines of existant horsed farm wagons will have a great vogue in a few years, just as the motor buggy now has with rural dwellers for pleasure driving and very light business purposes.

MOTOR 'BUSES IN FAVOR

Although the park commissioner of Manhattan has succeeded in stopping the operation of the double-deck motor omnibuses on Riverside Drive in New York City, the action has had one good result—it has shown by the numerous letters of protest from citizens and property owners that have been written to the daily newspapers of the city, many of which have been published, that the public has been won over to the motor omnibus.

Of course, there was no reason for doubting this after observation of the patronage they received, yet the letters have been somewhat of a revelation in view of the many adverse and antagonistic reports received from abroad, particularly from London, regarding the opposition the motor 'buses have encountered there on account of their alleged noisiness, the foul odors they emitted, the mud they splashed upon pedestrians and the menace they offered to other users of the streets through skidding, failure of the brakes to operate properly and the excessive speed at which they were sometimes driven.

None of these complaints has been heard in New York concerning the Fifth avenue and Riverside drive service; on the contrary, there appears to be an overwhelming preponderance of favorable criticism and a severe condemnation of the action of the park board in arbitrarily and without reasonable excuse taking from the people the only inexpensive means they had of direct transportation to the drive, and a form of recreation that was much enjoyed by visitors.

The evidence thus presented is a clear indication of the success that might reasonably be expected to follow the establishment of similar motor 'bus lines in other places where there are inadequate transportation facilities. It especially proves the merit of the Continental principle of "no seat no admittance," which was adopted by the operating company when it started the service and gave orders to its conductors to take on no more passengers when all the seats were filled.

The letters of protest, furthermore, have developed the interesting fact that Americans as well as Europeans not only will ride on the seats on the upper deck of 'buses, but that they prefer them to the inside seats in all but rainy or exceedingly cold weather.

INCREASING COST OF HORSE SERVICE

Whatever differences may have existed in favor of horse-flesh between the cost of delivery work by motor truck and horse-drawn wagons is being or already has been wiped out by the constantly increasing cost of feeding and stabling horses and the decreasing cost of maintenance of self-propelled vehicles.

At a banquet of retail coal dealers held in New York City during the past winter the attention of the dealers was called to the greater cost of feeding horses by W. F. Blaisdell, head of the Curtiss-Blaisdell Co., of that city, believed to rank as the second largest retail coal company in the world. His company had found that the cost simply of feeding its horses during the year 1908 was $49.32 per head more than for the preceding year, or a total of $14,056 for the entire stable. The increase in cost for the year 1908 over that in 1907 was more than $18,900. This was merely one item of many in connection with the cost of delivery. His company, he said, had paid $20,000 more in wages last year than two years before.

Commenting on these facts, the *Retail Coalman* calls attention editorially to the failure of the majority of retail dealers to keep accurate accounts of all the various items of expense in order to enable them to know definitely the exact cost of their delivery work. Few dealers watch the matter of expense closely enough to have a full appreciation of the extent to which the total cost has been increased, which means, of course, that their net profits have been correspondingly decreased.

If retail merchants in all lines made a practice of keeping separate accounts of the cost of their delivery systems, they would become much easier converts to the substitution of self-propelled vehicles for their horse service.

During the tariff revision work that has been going on in Congress the past month, the Senate passed an amendment increasing the duty on motor cars imported to the United States from the present rate of 45 per cent ad valorem to 50 per cent ad valorem. The House of Representatives had not taken action on automobiles at the time of going to press, so there is nothing decisive as yet; the action of the Senate in increasing the duty and of the committee which drafted the new tariff bill in making no reduction in the rate merely indicates the probability that at least no decrease need be expected in the rate on the final enactment of the measure.

New York's proposed taximeter inspection and fare-regulating measure, which has been before the council for the last two months, came up for action by the aldermen on May 19, after having been buried in committee for some weeks, and then was referred to the law committee by a vote of 35 to 22. Advocates of the bill have pushed it strenuously and the public has urged it, while the taxicab operating companies have offered no open objections except to point out certain absurdities in it, such as making one rate of fare for "taxicabs" designated as two-passenger vehicles, and "taxicoaches," described as carrying three or four persons. Still, influences seem to have been at work to prevent the passage of the measure, and it is hinted that there is a disagreement among the aldermen regarding the division of the seventeen inspectors to be appointed under the ordinance if it passes.

The use of the motor wagon in the delivery of goods by the big stores of Chicago, has caused, in at least one instance, an innovation in the matter of pay to employees engaged in the service. This employer pays his commercial vehicle drivers a regular salary, but in addition each driver is given a bonus for trips. If a driver so handles his route and his machine that he is ready to make extra trips, he takes his turn at the extra work and is paid extra for the extra time.

It often happens that there is a rush of business on a certain day, or there may be extra work in handling a line of stuff on which the store has a sale. All this requires expedition in delivering the goods, and the vehicle drivers who are speedy and yet care for their machines in such manner that they may stand ready for an emergency, increase the weekly salary materially.

The object of the firm in making this arrangement with its drivers was, first, to stop loitering on routes and driving pell-mell to make up lost time, and, second, to insure better care of the vehicles. Up to this time the plan has worked well.

The public opposition to innovations of all sorts and the failure of the mass of the people to aid the march of progress are well known and are facts always to be reckoned with by inventors and leaders in all great movements. When the conditions are understood and admitted, it is easier to be patient and tolerant, knowing that the opposition grows out of a lack of knowledge and often from fear of the consequences. The following quotation anent the subject of matches, clipped from a Salem newspaper of June, 1836, illustrates the point: "Notwithstanding the convenience of those dangerous little articles which are in almost everybody's hands, but which, with all their charms, bid fair to prove a heavy curse on the community, we learn there is one man in Salem, a respectable tradesman who keeps a store where we should generally expect to find such things, but who has never sold them or allowed them to be used on his premises. He sticks to the flint, steel and tinder; he shows his wisdom in so doing. How many more can say as much?"

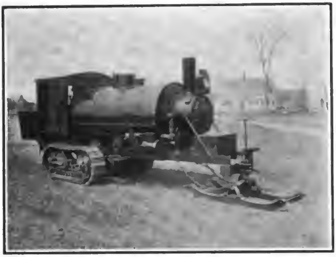
Rubber gathering in the Amazon River district is a hazardous and difficult undertaking, says H. S. Firestone. The supply comes from wild trees scattered throughout dense forests, to which paths must be cut through the tangled and luxuriant undergrowth. Even then the trees can only be reached during three to five months of the year, as throughout the wet season the forests are completely inundated. The climate is so unhealthy that white men cannot do this work and it is necessary to rely upon the native blacks, who at best are undependable and lazy.

LUMBER TRACTORS IN THE MAINE WOODS

LESTER M. HART

REPORTS received in Portland from the Maine woods say that the steam log hauler is rapidly supplanting the horse. It is predicted by lumber dealers that it will be only a few years before the steam hauler will be in almost universal use in the woods of Maine and generally in the lumbering business throughout the country. This, at least, will apply to the big companies that take out 3,000,000 to 4,000,000 feet of lumber in one place.

Even when the snow in the Maine woods is four feet deep on the level, the steam log haulers are used with great success over the made roads of the forests. Provided with a good road, it is estimated that the tractor will do the work of about forty horses in a day. To make the road for the hauler the men go into the woods before the snow comes, "swamp" out the way, smooth out the cradle knolls and fill in the hollow places with skids, giving a good foundation for the snow. It is not absolutely necessary to have the road level, but it must be hard and smooth to give a good foundation for the dogs on the driving wheels to take hold. The speed of the machine, of course, depends upon conditions, but the average is about five miles an hour.



STEAM LOG HAULER USED IN MAINE

"If there is plenty of lumber to be handled, there can be no doubt that the steam log hauler is more economical than the horse," says a Portland lumber merchant. "The entire equipment costs only $8,000, while 40 horses that would have to be used to do the work would cost approximately $600 a pair, or $12,000. Then the hay and grain for their feed make an expense that is greatly to be considered, as are also the wages and board of the men necessary to care for the animals.

"With the log hauler the fuel is but a small item, for the machines for the most part burn wood, and although they will consume a cord and a half a day while in operation, this wood can be readily obtained right where the machine is working at little or no expense. Three men can take care of the hauler—the engineer, fireman and pilot. The pilot sits on a small seat in front of the boiler over the sled on which the forward end of the machine rests and directs its course in much the same way that a youngster steers a double-runner while coasting.

"The forward end of the machine rests lightly on the steering sled, allowing most of the weight to be sustained by the driving wheels at the rear. When the log train is complete, there are four sets of sleds attached to the hauler. These sleds are connected to the machine and to each other by large sticks of timber crossed to allow the sleds to make turns and to prevent the sleds from crowding the hauler when they are loaded.

"Last winter the steam log haulers were more in evidence in the Maine woods than ever before. The Stockholm Lumber Company was the first in the State to use the log hauler to any advantage. During the season of 1905-06 it was fairly successful with the machine. Since then other companies have adopted the tractor and they are now in quite general use.

"The steam log hauler is of greatest value in opening up new timber lands where it is impracticable to attempt to get the logs out by driving on account of the small size of the streams and where the haul is too long to be attempted by horses. In such places there is always plenty of big timber, because heretofore it has been impossible, or next to it, to get in where it can be found and get it out with horses. Now all that the operators have to do is to put on men, prepare a road and go in with their big steam haulers and bring the logs to the nearest drivable stream."

ON THE SUBJECT OF ROADS

At a recent meeting of the Institution of Civil Engineers in London, H. R. Mallock, F. R. S., read a paper on the construction and wear of roads, with special reference to motor vehicle traffic. A very interesting digest of this paper is published by the London *Times*, which says:

"The author stated that the introduction of soft tires and mechanical propulsion had created new conditions of road use, some of which were more and others less exacting than those arising from older traffic conditions. Most of the existing literature treated the subject from the practical point of view, but his paper was concerned rather with the theoretical aspect of the subject. The divisions of the subject were foundations, surface and wear, including effects of speed, drainage and the dust problem.

"Dealing with foundations, he would point out that the important conditions to be observed were strength to resist local pressures without deformation and proper distribution of pressure, so that the ground was not disturbed beyond the elastic limit. The ideal foundation should form a bed the properties of which should change gradually and continuously from the natural ground to the surface carrying the traffic.

"With regard to road surfaces five distinct types were in use in this country, stone blocks or sets, wooden blocks, asphalt, macadamized roads and broken stone with a binding of tar compounds. The hard Australian woods had a durability approaching that of stone. Asphalt pavements probably required less tractive effort for haulage than any other road surface. The tar compound roads appeared to combine many of the advantages of asphalt with the comparative cheapness of broken stone, and their wear and cost of upkeep were said to be considerably less than macadam, but with a higher first cost. The large limits of elasticity which these binding materials gave to the surface lessened the destruction by crushing, prevented it becoming loose, and in both ways reduced the amount of dust which would otherwise be formed. An essential condition to the success of tarred roads was that the metalling should be capable of holding the tar firmly.

THE AREA OF CONTACT.

"The author had made experiments on the area of contact between various paving materials and tires. The softness of the india-rubber solid tire gave a large area of contact and greatly reduced the mean pressure. The contact area of each motor omnibus tire in London was approximately 13 square inches, giving a mean pressure of 120 to 140 pounds per square inch. For an iron-tired wheel of the same radius the area of contact would be .6 square inch, and the mean pressure 3,000 pounds per square inch. With pneumatic tires it was nearly correct to take the pressure on the ground as uniform over the whole area of contact, and equal to the air pressure in the inner tube. The area of contact was obtained by dividing the load by the internal pressure.

"With regard to the effect of speed, the destructive effect could not be less than proportionate to the square of the speed with a constant deducted, and it might be greater when the speed was high enough to make contact discontinuous. The distribution of pressure was changed with the stages of compression and expansion in the road over the area of contact. On ordinary roads by far the larger part of the resistance, as far as iron-tired vehicles were concerned, was due to the destruction of the surface by the high pressure developed over the area of contact, and even pneumatic tires might cause wear, by making the loose parts of the road material grind on one another.

THE SUBJECT OF DRAINAGE.

"On the subject of drainage at least one practical road surveyor believed that a road lower in the center than at the sides and with a central drain would be the most suitable form, and such a road would tend to keep the footpaths free from mud. The formation of dust and mud was almost entirely due to the destruction of the road surface by iron tires and iron-shod horses, and to a large extent the tractive force required in such cases was a measure of the amount of destruction caused.

"There were several points of interest in connection with the dust nuisance, and the stream lines of air round tires was a subject worth investigation. There was little doubt, however, that the dust disturbance due to a current of air would vary as the square of the speed, and the dust raised by a tire would vary as the square of the diameter of the outer tube and as the square of the velocity. It was impossible to resist the conclusion that the real enemies to good roads were iron tires and iron-shod horses. The wear could be minimized by the use of such plastic binding material as properly applied tar compounds."

MOTOR CARS' EFFECT ON ROADS

Whether motor cars injure the wagon roads or not, and if so, to what extent, is to be determined conclusively by a series of experiments to be carried out jointly by the United States Office of Public Roads and the American Automobile Association.

Experiments have already been made along this line by the government authorities on stretches of the Aqueduct road above Cabin John's bridge near Washington and in the capital on the Potomac speedway, the surface of the former being in the natural dry state of a well-built macadamized road and that of the speedway having been treated with crude petroleum for a considerable period to keep down the dust. Cameras were used for securing photographs of the amount of dust raised on the two surfaces by motor cars passing at varying speeds, and to show the effect of the tires on the road surfaces.

Other tests are to be made on different roads with a view to determining the best materials for road construction and especially for the treatment of the surface to prevent the movement of rubber-tired vehicles from drawing the fine binding material away from the interstices between the coarser fragments of crushed stone, causing the metalling of the road to disintegrate and at the same time scattering the dust in intolerable clouds.

The government authorities realize that solution of the dust problem is the solution of the road question and that roads must be constructed to meet the requirements of motor transportation at relatively high speeds.

PACKARD TRUCK IN FARM SERVICE

One of the multitudinous uses to which the motor truck can be put in its effective substitution for the horsed vehicle is illustrated in the accompanying reproduction of a photograph, taken on the estate known as Conyers Manor at Greenwich, Conn., last winter.

Conyers Manor is one of the most notable estates in the East, which is not merely ornamental, but a great farm operated on a commercial basis. It represents 1,300 acres of reclaimed land and is the home of E. C. Converse. Aside from being a beautiful estate, it is typical of the great advancement which has been made in modern farming, and especially in the way of applying scientific and commercial methods to agriculture. Motor cars are common at Conyers Manor. Not only is there a large and well equipped private garage for the several pleasure cars, but there is a separate garage for commercial vehicles which it is proposed to use extensively. The basis of work in the commercial vehicle line, now on the farm, is a Packard 3-ton truck.

MOTOR VEHICLE GARAGE AT CONYERS MANOR

Conyers Manor is about nine miles outside of Greenwich. The principal work of the Packard truck is in running back and forth between the farm and the town. Its regular platform body has a special grain body inserted inside the regular stakes. By removing this inside body when it is not desired to haul grain to Greenwich, the truck, with its regular body, is ready for use in its other work of carrying fertilizer, coal, machinery and general supplies. The special motor truck garage which has been erected at Conyers Manor has room for the accommodation of four 3-ton trucks, it being intended that eventually at least three or four trucks will be in regular service.

SALE OF PHILADELPHIA 'BUS LINE

An order for the sale at public auction on May 25 of the effects of the defunct Auto Transit Co., of Philadelphia, was issued by the Court of Common Pleas upon application for permission by George McCurdy and the Commercial Trust Co., who had previously been appointed receivers. The action was taken in consequence of a suit brought by the Electric Storage Battery Co., the largest creditor.

The Auto Transit Co. operated thirty or forty electric omnibuses of the double-deck type built by the Commercial Truck Co. of America on Broad and Diamond street routes for more than a year, having organized the service a year ago last July. It became involved in financial difficulties, including the pressing of a claim by the city for payment under an agreement whereby the 'bus company was to pay a certain amount for keeping in repair the streets through which it operated its machines. Insistence upon the payment of this claim forced the discontinuance of the service.

INDIANAPOLIS EXPRESS DELIVERY SERVICE

A successful local express service in which a very important part of the work is performed by motor trucks is conducted in Indianapolis by the City Express Parcel Delivery Co., with office at 30 East Georgia street.

The company is a delivering concern, covering every part of the city and surrounding suburbs and making deliveries for stores and express companies.

Four regular daily deliveries are made, at 9.30 and 11.30 a. m. and 2.00 and 4.30 p. m., covering all inside points within a territory bounded by Fall creek on the north, the railroad on the east including Woodruff place, Shelby street on the south to Morris street, and by the river on the west. One regular daily delivery is made in all suburbs at 11.30 a. m. The company delivers "anything," collects payment on C. O. D. packages, transfers trunks to and from stations and makes a specialty of handling freight.

In this work it employs a one-ton Rapid and a two-ton Coppock gasoline truck. The Rapid has been in service for 18 months and has given splendid service with only light repairs. In addition, the company uses twelve horse-drawn wagons and two heavy drays, and employs from 20 to 25 men.

Manager C. T. Austin says that the motor cars have proved a great addition to the business and that the company could not get along without them. They average from 15 to 20 miles per trip and the Rapid covers about 75 miles a day. The machines are kept in a public garage under a maintenance contract.

Two men accompany each truck on its trips. The freight and express packages collected are taken to the office of the company and there sorted and routed for delivery, the motor wagons taking the loads on the long runs to the suburbs and the heavy loads that are required to be transferred quickly.

MOTOR MAIL WAGONS IN JAPAN

The minister of communications of Japan is reported to be investigating the advisability of transporting mail by motor wagons in the principal cities of the Flowery Kingdom. Cars to be bought will first be tried in Tokio and Osaka and if found satisfactory the service will be extended gradually to other cities and in time may also be extended to points not yet reached by railroad. The machines are to be supplied by Tomijiro Oguri, a Tokio merchant, who will act as a private contractor to the government and who may, if investigations prove encouraging, establish a manufactory for the vehicles. It is probable that if the cars are imported for the government they will be admitted to Japan free of the 50 per cent. ad valorem duty now levied upon automobiles, but it is more than likely, if the matter is favorably decided, that the motors, frames, transmissions and other parts and tires will be imported and the cars assembled and fitted with bodies in Japan.

FIRE CHIEFS DISCUSS MACHINES

The possibility of installing motor fire engines throughout New Jersey to take the place of the present horse-drawn apparatus was the principal topic of discussion at a recent semi-annual meeting of the fire chiefs of New Jersey held in Newark. The chiefs agreed that the future type of fire fighting machine will be motor driven and will be built so that the power of the engine can be transferred to rotary pumps developing a pumping capacity of 700 gallons a minute with a 70-horsepower motor. Regarding the expense of maintaining the motor fire engine, Chief Stagg, of Paterson, said that in Paterson the self-propelled machine would do away with the expense of keeping five head of horses. It was also pointed out that seven men would be all that would be required to man the machine, as the engineer could drive the car and also operate the pumps, and that other incidental expenses could be saved. It was asserted that in Springfield, Mass., the cost of maintaining motor apparatus for one year was less than $550 for fuel and repairs.

THE AVERAGE FOREIGN ENGINEER has little opportunity to rub elbows with his kind, at least publicly and with the approval and support of his employer, writes Henry E. Coffin, chairman of the A. L. A. M. Committee on Tests. Not very many years ago, here in the States, it was practically impossible for a member of the engineering staff of one concern to pay a visit to the works of a competitor, unless he went in disguise or under false pretenses. What a difference now, when a visiting engineer is freely, courteously and willingly shown through every nook and corner of a competitor's plant, and sent away with the feeling that the "latch-string is always out."

OF INTEREST TO VEHICLE BUILDER AND BUYER

Notice was sent recently by the New York Fire Insurance Exchange to all the owners of piers and docks in New York, Brooklyn and Jersey City that an increase of 50 cents per $100 would be made in the premium rate on all policies issued on docks and goods contained in warehouses thereon to which motor trucks employing gasoline as fuel or for motive power were admitted. The increased premium exacted as a penalty for permitting gasoline or steam vehicles to enter the docks amounts to a 50 per cent. increase in the rate. The only way in which payment of the increased premium could be avoided by the owners of docks was to execute a warranty agreeing to prohibit all such vehicles from going upon the piers. This move is a direct setback to the efforts that have been made during the last two years by the national motor car associations and the New York Automobile Trade Association to have the restrictions against gasoline and steam trucks removed, in which they were partially successful with the dock owning companies. Notwithstanding this action of the insurance interests, the associations will continue to their efforts along this line.

The Studebaker Company is erecting at the corner of Michigan avenue and Twenty-first street, Chicago, what will undoubtedly be one of the most elaborate and finely equipped automobile salesrooms and garages in this country. The building will be of solid concrete, seven stories in height, with a frontage on Michigan avenue of 75 feet and 175 feet on Twenty-first street. It is expected that the building will be ready for occupancy about January 1, 1910, and as soon as completed the automobile department of the Studebaker company, now located with the carriage repository on Wabash avenue, will take possession of the entire building.

A bulletin has been issued by The Williams Foundry & Machine Company of Akron, Ohio, describing its vulcanizers for the repair of pneumatic tires. This company also manufactures air compressors and tanks for tire inflation, which are specially useful in commercial garages where taxicabs are housed.

In the earlier days of the motor vehicle it was practically impossible to secure insulated wire of American manufacture for the ignition system of gas motors. Since that time, however, great progress has been made in the production of suitable rubber covered wires and cables, and among the domestic manufacturers who have developed a high degree of skill is the Diamond Rubber Company, of Akron, Ohio. Its reputation as a maker of rubber tires for vehicles is well known, but fewer persons realize that this company is in the insulated wire business on a very large scale. Its wire plant contains more than five acres of floor space and is fully equipped for the production of insulated wires and cables of all sizes and for a great variety of purposes. For the motor vehicle trade its principal products are plain and braided ignition cables for gas motor vehicles and charging cables and connecting wires for electric vehicles.

A bridge whist score book has been issued by the Waverly Company, of Indianapolis, Indiana, to advertise their electric vehicles.

The many friends of Mr. E. LeRoy Pelletier in the motor vehicle trade will be glad to learn of his return to his office in the Everitt-Metzger-Flanders Co. plant in Detroit fully recovered from a very severe attack of pneumonia.

The sale of Frontenac motor vehicles in Passaic, N. J., has been intrusted to Mr. E. J. Bauret, who is well known in the agency field.

A supplementary catalogue of machine tools and accessories for general work has been issued by the Niles-Bement-Pond Co., 111 Broadway, New York. It is in loose leaf form, with tabbed index leaves for ready reference. Each sheet is devoted to a single type of machine, and contains a well-executed engraving of the complete tool with explanatory text, so that the size and capacity of the machine can read right off. The tools illustrated and described cover an extremely wide range of machine shop operations, and include, among others: Lathes, shapers, planers, millers, cold saws, slotters, drills, boring mills, bolt machinery, grinders, hammers. Many of the machines are the product of the famous Pratt & Whitney shops. The work is of great value for reference in the office of the automobile engineer and works manager.

The Novelty Manufacturing Company, of Waterbury, Conn., will soon issue a catalogue of automobile hardware and accessories, the auto department being now in charge of F. L. Cowles, formerly executive secretary and treasurer of the National Association of Carriage Hardware Manufacturers.

A change of dates for the Chicago Automobile Show has been under consideration, but owing to the bookings for the Coliseum it is necessary to adhere to the dates as originally announced, viz.: February 5 to 12, 1910.

The twelfth annual catalogue of motor car, motor boat and motorcycle parts, fittings and accessories, issued by Charles E. Miller, 97-101 Reade street, New York City, is being distributed for the season of 1909. It embraces 236 pages, copiously illustrated and well prepared with descriptive matter and full price lists. The Miller catalogue is, as usual, one of the most complete issued, as the Miller supply house is one of the largest in America. There is probably not a sundry made in the motor car line that this house cannot supply. Some of the articles listed are suitable for use on commercial vehicles. Among these are ignition batteries and magnetos, clocks, lamps, spark plugs; pneumatic tires, tire chains and spare wheels suitable for taxicabs; chauffeurs' clothing, and so on.

Davenport, Iowa, now has a motor patrol wagon.

At a recent meeting of the Committee on Relief of the Poor in Richmond, Va., it was decided to ask the City Council for an appropriation of $4,500 for the purchase of a motor ambulance to be used for emergency cases at the City Hospital.

Offices and salesrooms of the Knox Automobile Co. in New York have been removed from 1595 Broadway to new and more commodious quarters at 1966 and 1968 Broadway, in Lincoln Square.

A very useful folder has been issued by the New York Transportation Co., agents for the Exide batteries in New York, giving a list of the electric vehicle charging stations in Greater New York, Jersey City, Hoboken, Coney Island, Yonkers, Mount Vernon, White Plains and East Orange. On the reverse side of the sheet is printed a map of Manhattan and the Bronx, 5 by 20 inches in size, showing the locations of the forty stations located in these boroughs. All but three of these are on Manhattan Island. There are fourteen in Brooklyn. On one page of the folder are given the distances from the Battery to various principal points in the city and its vicinity, commonly called the metropolitan district. These figures are particularly useful for truck users, electric pleasure vehicle owners and taxicab patrons.

Agencies for the sale of Frontenac gasoline trucks and pleasure cars have been placed by the Abendroth & Root Mfg. Co. with P. J. Forbes, 96 Schermerhorn Street, Brooklyn, N. Y., for the Brooklyn territory and with Anton T. Smith, Jericho Turnpike & Tyson avenue, Floral Park, N. Y., for Nassau County, Long Island. At Baltimore, Md., Meredith Dryden has been appointed agent.

A catalogue has been issued by the Gramm-Logan Co. of Bowling Green, Ohio, describing in detail the construction of its commercial vehicles, which range from a light delivery wagon of 1,500 pounds capacity, through various types of heavier passenger and freight vehicles, up to the gasoline motor truck of 3 tons capacity.

The Brennan-Leopold Company has secured the New York agency for the Gaeth delivery wagon and has established headquarters in the Motor Mart in the automobile district on Broadway. It reports very good prospects of selling a number of these wagons during the year.

The Chicago *American* is getting remarkable service from three Randolph gas motor trucks which it installed for newspaper distribution to newsdealers in suburban districts. Each one of these three machines covers between eighty and one hundred miles every day between the hours of 1 o'clock in the afternoon and 8 o'clock at night. The machines are operated six days in the week.

The State Armory grounds at Syracuse, N. Y., are being rolled this spring by a gasoline motor roller built by the Chase Motor Truck Co., of Syracuse. The roller is more satisfactory than a horse-drawn roller, because at this season of the year, when the ground is soft, the horses' hoofs would cut into the turf and soil. The truck company has received many orders for its power rollers.

Following a test of a Webb motor fire engine in St. Louis recently, Fire Chief Swingley said that the machine proved as efficient as the steamers in use for several years, and in addition, it would carry a dozen men to any point in less than half the time consumed by horse-drawn engines.

The Bangor-Easton Auto Line has been formed in Pennsylvania, with $10,000 capital stock, to operate a motor stage line between Easton and Bangor in that State.

Rockford, Ill., has readvertised for bids for a self-propelled fire engine in order to give two local motor car concerns a chance to make offers. They claimed that they could buy the chassis and pumps and assemble as good machines as were offered by other companies at a lower price. Four of the aldermen favored motor apparatus, while three preferred steam engines.

Trustees of the hospital at Kankakee, Ill., have decided to buy a motor car for the use of the superintendent and the institution.

At a recent meeting of the Board of Public Safety of Akron, Ohio, a contract was given to the Webb Motor Fire Apparatus Co. for a self-propelled combination pump, chemical and hose wagon to be delivered before July 1. Bids had been received also from the Robinson Fire Apparatus Co., of St. Louis, and the Luitweiler Co., of Los Angeles, Cal. The purchase last winter by the city of three combination chemical engines from the Webb company is held up by an injunction, allegation having been made that the Webb bid was not the lowest received. The case is still pending in the State Supreme Court.

Elmore "two-cycle" cars are being used in their business by the United Gas Improvement Co. and the Filbert Paving Co., of Philadelphia. The former company recently added a second Elmore to its equipment, to be used by the superintendent of the Germantown district. The Filbert company employs the cars in its contracting work, enabling its inspectors to cover a large territory in a short time.

A single-cylinder Cadillic delivery wagon has been used during the last eight months by the Chattanooga Steam Laundry, of Chattanooga, Tenn., and the only repair work needed during that period was the fixing of one puncture, at a cost of 40 cents, it is said.

The motor patrol wagons and ambulances belonging to the city of Chicago have had their pneumatic tires treated with a patented preparation called Kemizite, manufactured and marketed by the Auto Tire Security Co., 1231 Michigan avenue, Chicago. This chemical preparation, which is introduced into the tire through the valve stem, possesses the peculiar property of healing punctures instantly. While under pressure in the tire the composition remains in a semi-fluid state, but when it oozes through a puncture and comes in contact with the outer air it solidifies to the consistency of soft rubber and seals the hole. It is especially suitable for public service vehicles, such as taxicabs, ambulances and patrol wagons fitted with pneumatic tires, as these are subject to frequent punctures, and yet cannot tolerate the delays incident to the removal and replacement of tires on the street. The decision of the Chicago authorities to use Kemizite was arrived at only after the preparation had been used successfully by taxicab concerns there and on demonstrating machines of several motor car concerns along Michigan avenue. More than 10,000 cars in the United States are now said to be fitted with tires treated with the stuff, and two-thirds of the cars entered in the Glidden tour this summer will be equipped with treated tires.

Three Frontenac 3-ton trucks have been sold by the Abendroth & Root Mfg. Co., 1621 Broadway, New York, to the New York Butchers Dressed Beef Company, one of the large dealers in meats in the metropolis. These machines were selected after severe tests in actual service.

The New England interests of the Hoyt Electrical Instruments Works are now being looked after by E. W. Carter who took charge last month. R. M. Merritt formerly New England manager resigned to become associated with the Wetmore-Savage Company of Boston.

A very complete catalogue of motor vehicle accessories has just been issued by James L. Gibney & Bro., Philadelphia, Pa. From comparatively small beginnings this house has been developed into one of the most important supply depots in the East under the able management of the owners, who give their personal attention to the business. The solid tires handled by this concern are widely known among commercial motor vehicle users.

Several new motor 'buses were delivered last month in Albany for a stage line that is to run from Albany, N. Y., through Normansville, Elsmere, Delmar, New Salem, New Scotland, Thompson's Lake, East Berne and Warner's Lake to Berne.

Bananas, peanuts, watermelons and other fruits and nuts are to be hauled exclusively by motor truck from New York City to Huntington, Long Island, a distance ol 38 miles, by a Manhattan 5-ton gasoline truck purchased by a Huntington fruit dealer.

According to H. G. Hamilton, general manager of the Rapid Motor Vehicle Co., of Pontiac, Mich., there is now 80 per cent. more business on the books of the company than at any time last year. The company recently moved into its new factory, which has four acres of floor space.

The Hamilton Volunteer Fire Co., of Baltimore, Md., formally installed its new motor fire truck in April, with addresses at the town hall by Governor Crothers of Maryland, Mayor Mahood of Baltimore, State Senator Biddison and State Fire Marshal Elwell and others.

At a meeting of the Des Moines city council last month a resolution was introduced instructing the superintendent of streets and public improvements to buy a motor car for the use of his department.

Applications have been made by three different concerns to Secretary A. P. Fleming, of the Los Angeles Harbor Commission, for permission to establish motor truck lines between Los Angeles and San Pedro harbor. It is proposed that the vehicles shall not only run between the harbor and Los Angeles, but shall haul freight to points much further inland.

The recommendation of the fire commissioner of Brookline, Mass., for the creation of a "flying squadron" of motor fire wagons similar to Springfield's flying squadron has been approved by the Citizen's Committee of Thirty of Brookline. The committee also advocated an appropriation of $97,600 for the fire department for the ensuing eleven months.

The Rapid Motor Vehicle Company has opened its factory extension and now has four acres of floor space. General Manager H. G. Hamilton reports a very large increase in business as compared with the condition at this time last year.

The Commercial Vehicle

Vol. IV July 1909 No. 7

MOTOR LIVERY SERVICE COSTS AND PROFITS

Details of Extensive Landaulet Installations in the British Capital Showing the Popularity of These Smart Vehicles When Hired Out on a Time Basis—Operating Costs and Fixed Charges, Also Profits

ARTHUR E. A. M. TURNER

THE now extensive scale on which motor livery work is being carried on in London, and the receipts and expenses of some of the operators in this connection are undoubtedly interesting and somewhat instructive.

SMART LONDON LANDAULET HIRED IN PRIVATE SERVICE BY PUBLIC CAB COMPANY

With the exception of the Panhard cars let out by Tillings, the 15-horsepower Charron landaulettes were the first make of machine put seriously to livery work in London, these being in the hands of the General Motor Cab Co., Ltd. Since early in 1907 these cars and the department which manages them have proved a phenomenal success. The vehicles are let out at fixed charges corresponding to those made by the Fiat Motor Cab Co., Ltd., for their 15 horsepower cars as stated hereafter, the charge including the driver, fuel, lubricants, etc. They are carefully looked after and driven, and form quite ideal motor carriages for either town or touring. The writer, after several interviews with gentlemen connected with this venture, has had some important details relating to two years working of the Charron type machines given to him. It will not be waste of either time or space to consider the exceptional opportunity for earning a large income which a well managed motor livery department offers, taking London as an example.

At one time Londoners were astonished to read that the General Motor Cab Co. drew something like $12,500 per month from its fifty Charron landaulettes, but with the whole fleet working something approaching $18,750 is a possible total per month, what could be derived from the same source where hirers take the cars by the month? A much higher rate, however, is charged to casual hirers, say $25 per day, so at this charge one sees that the extraordinary figure of $6,500 per car can be received during 260 days, which we may call a working year. At the usual charge of $375 a month $4,500 per car per year can be drawn as a gross income.

Few in the past would have doubted the excellence of the Charron productions. The 12-16 and the 15 horsepower Charron chassis have undoubtedly maintained the high reputation which the makers have earned during the past, and in the big Brixton garage, where the General Motor Cab Co. keeps its cars, the writer gained a close insight into the operation of these machines (which are superintended in batches of ten) and has had the following details of two years performance and date of operating cost placed at his disposal. These are naturally extremely interesting, and are set out hereafter.

Details of ten Charron cars running from April, 1907 to April, 1908, on motor livery work, working 253 days a year, and covering 57 miles a day each on an average. Total mileage for the year equals 144,210 miles for the ten cars.

Wages of drivers	$5,460.00
Gasoline (7,590 gals. at 14c. per gal)	1,106.87
Lubricating oil	161.25
Sundries	115.00
Pneumatic tires (exactly 3.5c. per mile)	4,757.65
Repairs ($38.41 per car)	384.16
Insurance	1,300.00
Depreciation at 20 per cent	4,060.00
Interest on capital expended	1,015.00
Total	$18,359.93

This figures out in round numbers at $1,835 per car per annum including all charges, with the exception of garage standing room. This could not be ascertained.

During the period April, 1908-1909, the total mileage for the year for the ten cars ran to 162,260 miles, or 61 miles per day for each car for 266 working days during the period mentioned. The details are as follows:

Wages	$5,460.00
Gasoline (8,539 gals.)	1,245.25
Lubricating oil	208.32
Sundries	19.16
Pneumatic tires	5,365.72
Repairs ($93.24 per car)	932.50
Insurance	1,300.00
Depreciation	4,060.00
Interest on capital	1,015.00
Total	$19,605.95

This amounts to practically $1,960 per car per annum including all charges except the garage already mentioned.

For the 1907-1908 record the consumption of gasoline works out at exactly 19 miles to the gallon for the four-cylinder engine, while in the 1908-1909 details the fuel consumed is just one gallon less. That is to say, that if the number of gallons used during 1908-1909 was 8,540 instead of 8,539 the mileage would have been exactly 19 to the gallon; as it is, it is a fraction over this.

Considering tires, it is interesting to note that the cost for the second period is a little less. The total of $5,365.72 requires the addition of $50 to bring the cost up to 3.5 (3½) cents per mile, as was the case during 1907-1908. If the cost of body repairs be added to the foregoing tables of running costs we get $108.95 ($10.89 per car) for repairs of this nature to the ten cars during 1907-1908 (first period), and for the second period $352.50 ($35.24). The whole account gives what may well be considered a record of a really good performance characteristic of the Charron machines.

THE F.I.A.T MOTOR CAB CO., LTD.

Although the F.I.A.T Motor Co.'s trucks are not very widely used in the British isles, their make of cab is employed in some hundreds, and the private hire department of the F.I.A.T Motor Cab Co., Ltd., of 10 St. Pancras Road, N. W., seems to be turning out a lucrative and successful branch of the company's business. In connection with this the writer had recently a most interesting interview with Mr. F. H. Fowler, the Cab Co.'s manager and Mr. Hill, who superintends the department which lets out the motor landaulets. It appears that at present some fifty landaulets are employed for hiring out purposes. These are of the 12-16 horsepower, and 15-20 horsepower types, the former being let out at rates amounting to $2 per hour, $10.50 for a half day of 6 hours, $20 for a twelve-hour day, $100 for a week and $300 for a month. The 15-20 horsepower landaulets are charged for at rates of $2.50 per hour, $13.24 per half day, $26.24 a day, the further charges being $125 per week and $375 per month. The company supplies everything that is necessary for motoring in or near town, but when on country work the hirer has to board and lodge the chauffeur and pay for fuel and lubricants.

The vehicles are very nicely finished in blue and gold and recently, when the writer had the pleasure of trying one of the 15-20 horsepower cars, he found the vehicle most comfortable and luxurious on the road, quiet whether closed or open, and quite fast enough for touring, and ideal for shopping, theaters, and either town or country calls. As a matter of fact, these machines are in such demand that the department which caters for this class of work is kept quite busy all the year round, and something like $10,000 a month has been drawn from this source. Many of the Fiat private hire landaulets are in use by well-known people, and run almost all over the country.

While in conversation with Mr. Fowler on the question of two "v" four-cylinder engines for cab work, the writer was pleased to learn that for the whole fleet of some 400 vehicles an average consumption of 20 miles to the gallon of fuel can be obtained; in fact, when the engines are all thoroughly in tune, it is said that 21 miles will be about the average. It is quite possible that these motor

ONE OF THE CHARRON MACHINES OPERATED AS PRIVATE VEHICLES BY LONDON COMPANY

cab operators will increase both their taxicab fleet and private hire machines at an early date. On the whole things seem to be going very successfully at the late Vanguard depot in St. Pancras Road, where the Fiat Motor Cab Co. has its depot and offices.

Much interest may be attached to the fact that during 2 1-2 years (August, 1906, to March, 1909) a garage proprietor in South London who operated a pair of 12-16 horsepower Fiat landaulets on motor livery work ran one of them for the period at a cost of $1,427.93, exclusive of driver's wages, while the gross takings totalled to $4,558.62, the consumption of gasoline over this considerable length of time averaging 16.21 miles to the gallon.

TWO THOUSAND NAPIERS FOR SERVICE.

Another great effort to cater for the numerous customers who find it more convenient to hire a motor carriage than to purchase it is being made by the Coupé Company, of 14, Regent street, S. W. When the writer recently had an interview with Mr. Albert Fryers, the manager of the Napier Department, he learned that al-

LANDAULET OF THE PRIVATE HIRE DEPARTMENT OF LONDON FIAT CAB COMPANY though the majority of the 2,000 landaulets which they were putting into service would be employed as taxicabs, a good proportion of them (about 12 1-2 per cent) would go to form the motor livery department. These will be of the four-cylinder 15 horsepower type. This company's landaulets will, generally speaking, be finished in the Coupé colors—green and primrose, but where contracts are entered into for supplying them by the year, they will be finished to suit the user's taste. To casual hirers the same popular charges are made as those exacted by the Fiat cab company for the 15-20 horsepower landaulets. Preparations on an extensive scale are being made for the reception of the Napier fleet and several depots are being hurried to completion. The writer has at different times had ample opportunity to test these cars on the road and has traveled many miles in them, carrying loads of 40 stone (560 pounds) in many different counties. The following is an account of one of the best tests which came under his notice, and is appended as noted during the time, this being remembered as "Blizzard Week" in England.

LUXURIOUSLY FINISHED AUSTIN LANDAULET HIRED OUT AS PRIVATE MOTOR VEHICLE

Left London 1.15 p. m., arrived Wrotham 2.25 p. m., distance 26 miles. As it happened, the snow to within 5 miles of Wrotham, as far as my car was concerned, was a negligible quantity, but from here on it lay thick and no traffic had passed over it; also it had drifted, which compelled me to occasionally change down to second speed, in places where normally I should have driven on top gear.

The really serious delay on my down journey was caused by having to pass a large number of carts, which were stopped alongside tram lines, thereby congesting the traffic.

From Wrotham on my journey to Sevenoaks (7 miles distant) lay by Ightham, over one of the hilliest districts of Kent.

Leaving Sevenoaks at 5:45, I traveled by Westerham, Oxted, Redhill, Reigate, Dorking and Milford to Farnham without pause or hitch, except for the driving wheels showing a tendency to spin on a steep pitch leading from Dorking up to Wooton Hatch.

I must confess to a feeling of superiority every time I sighted a horse-drawn vehicle derelict by the roadside—and I passed many such, standing desolate and alone, the horse or horses having been removed.

In a few cases, where carts were actually on the move, the help of teams of not less than four horses had been requisitioned. Very conclusively did this prove to me that (even under the most adverse weather conditions) the modern method of locomotion is vastly superior to the old-fashioned horse.

It may be of interest to compare the two time tables given below:

Railway and Cab Journey.	*Motor Journey.*
1.00 p. m.—Leave office.	1.00 p. m.—Left London
1.25 p. m.—Leave Holborn Viaduct.	2.55 p. m.—Arrive Wrotham.
2.38 p. m.—Arrive Wrotham.	3.55 p. m.—Left Wrotham.
5.28 p. m.—Leave Wrotham.	7.20 p. m.—Arrived at destination near Farnham.
7.23 p. m.—Leave Sevenoaks (no other train)	Distance covered 77 miles.
8.45 p. m.—Arrive Victoria.	Running time, 4 hrs. 50 mins
9.00 p. m.—Leave Waterloo.	Average speed, 15.9 m.p.h.
10.36 p. m.—Arrive Farnham.	Total time occupied, 6 hrs. 20 mins.
11.06 p. m.—Arrive final destination.	
Total time occupied 10 hrs. 6 mins.	

Economy in operation is quite a feature with the 15 horsepower Napier, 23 miles to the gallon of gasoline being the average for long runs through town and country, while 1,000 miles on a gallon of lubricating oil is said to be a possible total.

From an engineer's point of view an interesting feature of the Napier chassis is the worm drive, this being arranged below the worm wheel. This position gives excellent opportunities for efficient lubrication, and in order to get over the difficulty which is usually experienced with universal joints when the above arrangement is resorted to, the engine and gear box are set at a slight angle from the front, in other words they "rake backwards" and so do away with the necessity of the cardan shaft being set at a very severe angle.

SERVICE WITH AUSTIN VEHICLES

The cabs turned out by the Austin Motor Co., Ltd., of Northfield, Birmingham, have already been before readers of this journal. The type in London in the service of Urban Taxis, Ltd., are much the same (with the exception of the body) as those dispatched to Spain; but the more luxurious cab is herewith shown while on private hire work in one of the most fashionable districts of London. These Austin machines are ten in number, and form a rather select fleet, the chassis of which should be of interest to United States makers, as it follows the design commonly followed in America. The 15 horsepower four-cylinder engine has cylinders cast *en bloc* and a bore of 89 mm. with a stroke of 101 mm. It is placed amidships, and immediately behind it comes the clutch and gear box. Ignition is by Eisemann high tension magnets, and cooling by radiator and rotary pump. As is the case with all the London cabs and private hire carriages, the final drive is by live axle. This type of Austin vehicle is very smart in appearance, very sweet running, and generally compact, and although the police stipulation is that cabs should be able to turn in a 25 foot road, these Austins will turn in 24 feet.

In concluding, the writer would like to add that many of the London motor livery departments are patronized by some of the best known people in the country. Tillings' at one time served the Lord Mayor of London with a motor carriage; while the Charron landaulet illustrated is carrying Miss Marie E. Vizetelly, daughter of the well-known editor and translator of Zola's works. The popularity of this latter type of chassis for either taxi-cab or motor livery work is really remarkable; 400 will soon be in service in London, 80 in Bristol, while others are running in many English towns. Fifty have been supplied to Brussels, a number for Egypt, and Australia.

DETAILS OF NEW YORK MOTOR MAIL SERVICE

WHEN the new motor mail service begins in New York City on July 1 nearly all of the mail between the branch post office stations in about two-thirds of Manhattan island and the most important and densely populated section of the Bronx will be carried by electric vehicles. The significance of this fact is not to be lightly considered. The area covered embraces upward of 20 square miles, where there is little vacant land except the reservations for parks, of which Central Park is the largest, and where the prevailing type of building is the flat and apartment house, rarely less than five stories high and often eight to a dozen or more stories in height. The territory includes the great residential section of New York City proper, being the only land directly contiguous to the lower business section of the island and tied to it with the best transit facilities anywhere in Greater New York. The territory has a population of somewhere between 1,000,000 and 1,500,000 persons, for whose mail facilities the government has provided 19 regular branch post offices, any one of them large enough to care for the postal needs of a city of 5,000 inhabitants or more, and more than half a hundred sub-postal stations usually located in drug stores.

A large volume of the mail matter, embracing all of the first class stuff and some of the small, light packages of lower class matter, is sent through pneumatic tubes underground to stations as far north on the West Side as Station J, at One Hundred and Twenty-fourth street and Eighth avenue. The tubes are in operation on week days from 4 A.M. to 11 P.M. On the East Side the first class mail only is carried on the front platforms of the trains of the Third Avenue Elevated Railroad all the way up to Bronx Park. With these exceptions, all the mail for the territory named will be transferred henceforth for at least the four-year term of the contract in motor wagons.

Upon the recommendation of Postmaster F. M. Morgan, of the New York General Post Office, the Post Office Department in Washington advertised on May 1 last for bids for motor wagon service. Twelve days later the contract was awarded to the Motor Delivery Co., which made a bid of $44,850 a year. The bid was made on a basis of 22½ cents a mile, and was made without regard to the rate paid for the same service by horse-drawn wagons, or that paid to the elevated railroad. The price includes the drivers' wages and the entire cost of operation and maintenance.

The new service includes and supersedes the electric wagon service established on Washington Heights on April 15 last, which was described in the May issue of THE COMMERCIAL VEHICLE. That temporary service was put on as a result of the adoption of "pay-as-you-enter" street cars on Amsterdam avenue. Formerly the first class matter for Station M at 1965 Amsterdam avenue and the Washington Bridge Station on Amsterdam avenue near One Hundred and Eightieth street, was carried on the street cars on the front platforms where passengers were not allowed to stand; but the new cars have provision for passengers on the front platforms so the mail sacks can no longer be carried there. Since April 15 they have been carried with other classes of mail in three electric wagons. During the first six weeks of that service not one of the regular thirty-four trips in each direction every 24 hours was missed, nor was one of the machines ever late in arriving at a station. This assertion of Manager Bardwell, who secured the contract, is corroborated by the Superintendent of Mails.

Under the contract for the larger service starting July 1, the contractor is required to furnish 14 vehicles, described officially as follows: "Two motor wagons of 4,500 pounds capacity, beds 10 feet long, 4 feet 6 inches wide, and 5 feet high; four motor wagons of 2,500 pounds capacity, beds 8 feet long, 4 feet wide and 5 feet high; and eight motor wagons of 1,300 pounds capacity, beds 6 feet long, 3 feet 5 inches wide and 5 feet high." The Department requires the contractor to retain this equipment for use in service on the routes specified unless otherwise ordered, "but reserves the right to require the contractor to furnish at any time during the contract term such additional equipment as may be necessary for a prompt and efficient service."

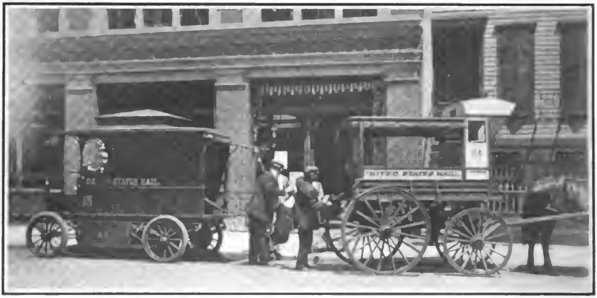
Route No. 407021
MAIL-STATION SERVICE

From	By	To	Distance	Number of Trips Daily, Except Sunday	Number of Trips on Sunday	Total Number of Trips a Week	Running Time
			Miles				*Min*
	EAST SIDE SERVICE						
Circuit No. 1:							
Grand Central Station	Stations Y, K and U	Station L	4.37	12	7	79	31
Station L	Stations U, K and Y	Grand Central Station	4.37	11	6	72	31
Willis Avenue Depot	Stations L, U, K and Y	Grand Central Station	5.32	1	1	7	39
Circuit No. 2:							
Station L	Stations X, R and T	Fox Street Station	3.57	12	6	78	23
Fox Street Station	Stations T, R and X	Station L	3.57	12	6	78	23
Station T		Fox Street Station	1.00	10	6	66	7
Fox Street Station		Station T	1.00	10	6	66	7
	WEST SIDE SERVICE						
Circuit No. 3:							
Grand Central Station	Grand Central Depot, Stations G, N, W, I and Morningside Station	Station J	6.00	2	2	14	45
Station J	Morningside Station, Stations I, W, N, G and Grand Central Depot	Grand Central Station	6.00	2	2	14	45
Grand Central Station	Stations G, N, W, I and Morningside Station	Station J	6.00	11	7	73	45
Station J	Morningside Station, Stations I, W, N and G	Grand Central Station	6.00	11	7	73	45
Circuit No. 4:							
Station J	College Station, Station at 145th Street and Amsterdam Avenue and Station M	Washington Bridge Station	3.20	34	12	216	23
Washington Bridge Station	Station M, Station at 145th Street and Amsterdam Avenue and College Station	Station J	3.20	34	12	216	23

All of the machines to be used are of General Vehicle Co. make and are new. Since the contract was awarded on May 12 the Long Island City factory has been working a day and night force on the assembling and finishing of the ten additional machines to supplement the four previously in use on Washington Heights. The general appearance of the wagons of the smallest size is shown in the photograph herewith reproduced, taken in front of the College Station on One Hundred and Fortieth street near Eighth avenue, where it met one of the light horse wagons to transfer the load.

Even so soon as this, when the new motor service is just being inaugurated, it is interesting to note that it is the horse outfit that looks strangely out of keeping and archaic, while the well-proportioned, substantial and capacious electric vehicle fits in harmoniously with the modern post office building in the background. The picture typifies the transition that is rapidly occurring between the two forms of transportation. Only a few years more and a wagon like that on the right will look as incongruous in any city of the first class as the horse street cars now look to the visitor in New York City.

By study of the accompanying schedule a very good idea can be gathered of the precise nature of the service to be rendered by motor vehicles. The routes are given in both directions, and a "trip" means a run one way only. The term "trip" is understood to cover all mail to go at one time from one point to another, whether one or more wagons are necessary to transport the mail. When several despatches are made at the same time and can be carried in one wagon, the transfer is considered a trip. The total length of the two East Side circuits, one way, is 9.89 miles, and that of the West Side circuits 9.20, or slightly more than 19 miles in all. The running time allowed means the actual time in transit; the time for loading and unloading is not included. The running time is made to conform to the limit allowed by local ordinance, and is on the basis of 8 miles an hour. Although the chief superiority of the motor wagon over the other means of transfer is the greater speed ability, it is hardly to be expected that the government department will ever demand the privilege of operating mail wagons in excess of the limit set by local laws, even when motor vehicles have wholly superseded horse-drawn wagons in the whole



CONTRAST BETWEEN OLD AND NEW METHODS OF HANDLING MAIL IN NEW YORK city. Whatever chance there will be of taking full advantage of the speed of the self-propelled vehicles probably will come through changes in the city or State laws either raising the maximum limit or abolishing it.

The schedule calls for 162 trips every week day and a daily mileage of 577.11 miles. There are 1,052 trips to be made each week, involving a weekly mileage of more than 3,800 miles and an annual mileage of over 197,700 miles. It is an exacting service, of course, because it must be maintained every day in the year without regard to weather conditions. Manager Bardwell calls attention to the fact that this is the first contract the government has entered into for an electric vehicle service. The post office service established several years ago in Milwaukee was performed by steam wagons while the services more recently established in Detroit and Indianapolis employ gasoline vehicles.

LOCATION OF BRANCH POST OFFICES.

CIRCUIT NO. 1—EAST SIDE.

Station.
Grand Central—45th St., between Lexington Ave. and Depew Place.
Y—on Third Ave. near 68th St.
K—on 88th St. near Third Ave.
U—at Third Ave. and 103d St.
L—at Lexington Ave. and 125th St.
Willis Ave. Depot—at Willis Ave. and 132d St.

CIRCUIT NO. 2—EAST SIDE.

L—at Lexington Ave. and 125th St.
X—on 138th St. near Willis Ave.
R—at Third Ave. and 150th St.
T—on 165th St. near Third Ave.
Fox Street—on Fox St., between 167th and 169th Sts.

CIRCUIT NO 3—WEST SIDE.

Grand Central—45th St., between Lexington Ave. and Depew Place.
Grand Central Depot—42d St., between Depew Place and Vanderbilt Ave.
G—on 51st St. near Broadway.
N—at Broadway and 69th St.
W—at Columbus Ave. and 84th St.
I—at Columbus Ave. and 105th St.
Morningside—not yet located; probably in W. 116th St.
J—at Eighth Ave. and 124th St.

CIRCUIT NO. 4—WEST SIDE.

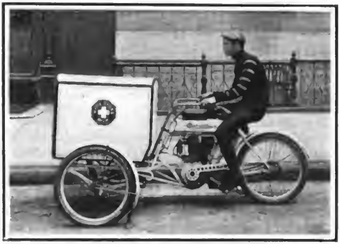
College—on 140th St. near Eighth Ave.
New station—at Amsterdam Ave. and 145th St., not yet named.
M—at Amsterdam Ave and 157th St.
Washington Bridge—on Amsterdam Ave. near 180th St.

The vehicles for the New York mail station service are to be stored in a new garage erected for the exclusive use of the Motor Delivery Co. at Nos. 3 and 5 Lawrence street, which extends two blocks westward from the end of West One Hundred and Twenty-sixth street, between Convent avenue and Broadway. The new garage is a brick building 50 by 100 feet and one story high, equipped with charging panels, washers and repair facilities sufficient for two dozen vehicles.

Mail Carrier Mark T. Hoffman, on Rural Route No. 2 out of Manchester, New Hampshire, uses a Waverly electric vehicle. The machine is in its fifth season, over a route twenty-four miles long with some stiff grades. There are about fifty stops on the route.

CREAM DELIVERY BY MOTOR VAN

Rapid delivery of cream in bottles is accomplished by the White Cross Dairy Company, New York, by the use of the Reading-Standard delivery van shown in the accompanying engraving. The motiye power is developed by a 3 1-2-horsepower, single-cylinder, air-cooled, gas motor with chain drive to the rear wheels. The body is made of sheet steel with double walls, the space between being packed with mineral wool as a nonconductor. The body opens in front with double-hinged doors and the interior contains suitable shelves and racks for carrying the bottles. These are transferred to the van from the refrigerating plant of the dairy, and, owing to the very excellent character of the body insulation, the use of ice in the van is unnecessary. The body measures 22 by 24 by 36 inches and contains 11 cu. ft. The machine is very attractively finished in white with red striping. It is likely that others of its type will be added to the service of the company.



R-S MOTOR VAN USED BY DAIRY COMPANY

In Discussing American Methods in motor vehicle construction, Mr. Charles Clifton, president of the licensed association, recently said: "It has become almost a truism that no other invention has in so short a time excited such a powerful influence upon mechanical engineering and its allied arts and sciences, or interested such a number of experts in its service, as the automobile. The nearest, perhaps, is the electric trolley system in the years of its first rapid development, but this involved quantity rather than quality and variety of work. The automobile industry has called upon all branches of engineering, mechanical, electrical, metallurgical—to surpass at a moment's notice the highest point of achievement reached by long years of growth. It 'hustled the steel-maker.' In view of the highly advanced state of mechanical engineering in all its branches a dozen years ago, it would seem that the automobile builder might have been satisfied with facilities so far in advance of those enjoyed by pioneers in earlier arts, but such has not been the case. Year by year his demands have become more insistent for finer materials and better tools. While for several years the American industry rested within the lines of the best general engineering practice, it some time ago took the master hand and rapidly forced the extension of all branches of metallurgy.

ELECTRIC VEHICLE CONSTRUCTION AND OPERATION---V*

Hints on the Equipment of the Lead Storage Battery Room for Vehicle Garages—Composition and Use of the Electrolyte—Apparatus and Chemicals Necessary for Testing Purity of the Electrolyte in Regular Service

LOFTUS G. COADE

IN the selection of a suitable battery room there are several points which deserve serious consideration, if the highest possible efficiency is to be aimed at. In the first place the "gassing" of the cells in fully charged batteries causes an irritating vapor to permeate the room atmosphere. Secondly, it is necessary to be able to examine the color of the plates, and artificial light is of very little use for this purpose. Thirdly, it is conducive in no small way to the battery men's health to give them all the fresh air and light that is possible. An ideal location for a room of this sort is on the top floor of the garage, if it be more than one story in height. It should be, if possible, lighted as well from the roof, though this is not essential if there is plenty of light in other directions. The floor ought to be of concrete, with a sewer drain in the center, so that it can be flushed from time to time. Wooden floors are useless, and quickly rot when acid is spilled. The walls should be of brick or concrete, and whitewashed, which will also help to brighten up the room.

Now in considering this it is not advisable to place the room too far away from where the vehicles are kept, for batteries are not easily moved about; if possible, vehicles whose batteries are in for repair ought to be in an adjoining room.

Any pipes in the battery room should be well covered with acid resisting paint, and a panel from the main switchboard placed nearby, with plenty of cable of sufficient carrying capacity at hand for making temporary connections. There should also be a few portable resistances for charging and discharging, though water tubs can be used advantageously for the latter. These conditions aim at having an ideal battery room, but it is more often than not that such will be found to be impracticable for various reasons. So the only thing that can be done is to get as near to them as is convenient. But don't locate your battery men down in cellars, old stables, or out under an open shed, especially when the snow is a foot thick outside, and then wonder why the maintenance cost is high, for battery men are only human like the rest of us. A typical battery room is shown in FIG. 1.

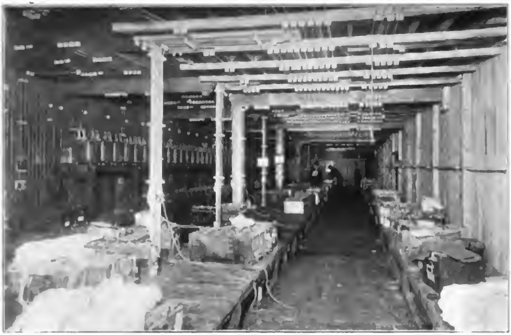


FIG. 1—LAYOUT OF TYPICAL EXIDE STORAGE BATTERY ROOM

EQUIPMENT OF THE BATTERY ROOM.

The following, in addition to the supply of cable, panel board, resistances, etc., will be required; of course the quantity will vary according to local conditions: A burning or welding outfit, consisting of a hydrogen generator, with a supply of zinc, etc., or, if near to a source of supply, it will be found more convenient to purchase the gas in cylinders ready made. One hundred to one hundred and fifty, or more, feet of soft rubber gas tubing. Tee connections, blow-pipe, with a supply of nipples or tips, etc. Where the latter cannot be had conveniently the alcohol torches, as illustrated herewith, FIG. 2, will be found very useful. One portable voltmeter, and also one portable ammeter, the former having two scales, one reading to 150, and the other to 15 volts. The ammeter should be of the loose shunt type, having a 75 ampere shunt. Both instruments ought to be of the dead beat variety. Specific gravity testing outfit, consisting of hydrometer, jar and syringe, or better still, one of the combined acid testing outfits illustrated in the previous discussion. Two or three large tubs, one of which ought to be square-shaped and lined with lead, for mixing the electrolyte in. A supply of pure stick lead for welding. Sulphuric acid, chemically pure, specific gravity 1.840, or electrolyte ready diluted to the proper density for the battery. Distilled water, stored in clean carboys, and if possible, a still for producing a supply, if such cannot be procured cheaply. Benches for assembling, and a couple of wheeled trucks whose floor is level with or a shade lower than that of the cradle in the vehicles, so that the battery crates can be pulled out easily onto the truck, and vice versa.

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*Continued from page 89, April issue.

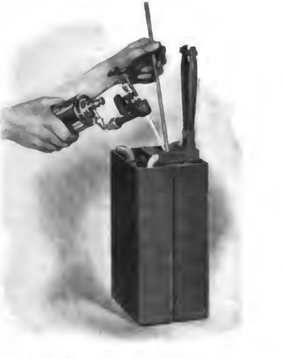


FIG. 2—WESTINGHOUSE ALCOHOL TORCH

ELECTROLYTE AND ITS PURITY.

A great deal of stress has been laid on the importance of using an absolutely pure electrolyte and of the proper density. The manufacturers, recognizing this point and the difficulty sometimes experienced in procuring a suitable acid, supply either the pure acid or electrolyte prepared ready for the battery. In many ways it is much the best plan to purchase from them direct, for the reason that they are large purchasers of the product themselves, and are equipped with proper facilities for testing every shipment that they receive. On the other hand it is often very much more convenient to purchase the acid locally, and if the battery man has no means of testing for undesirable ingredients he should send samples to his battery maker or a responsible chemist for analysis. Ordinary commercial sulphuric acid is made from iron pyrites, and may contain such substances as iron, copper, arsenic, etc., which would ruin a battery in short order were they permitted to enter the combination and remain there. The acid for storage batteries must be made from pure sulphur or brimstone, and even then acid not absolutely up to standard purity may escape the most careful manufacturer and cause serious battery troubles before its presence is discovered.

Again, if city water is used for dilution it is almost safe to conclude that it contains iron from the pipes, to say nothing of organic impurities in the water itself, so that its use with a perfectly pure acid would defeat the desired end. So the only thing to do is to test the acid on delivery, and the water and electrolyte at frequent intervals. Sometimes it happens that rust from the bolts in the frame of the truck, which are exposed to the fumes of the battery, may drop down into the cells, and in numerous other ways trouble may start, so that battery men have to be constantly on their guard, always watching for the development of battery "diseases." Ability to quickly discern such faults is not to be obtained by technical training alone but by long practical experience, each failure being carefully made a lesson for the avoidance of its repetition.

Should the acid be purchased at full density, that is 1.840 specific gravity, it must be handled carefully. During its manufacture the water is driven off, and it comes as a heavy oily liquid. It combines with water with great energy, and will absorb moisture from the air, hence caution is to be observed when mixing it with water or an explosive combination may ensue and the operator get severely burned. Always pour the acid into the water, very slowly, never the water into the acid, and it will be noticed that when pouring the acid into the water that it "boils" where it meets the water, owing to the chemical action between the two bodies.

TO PREPARE ELECTROLYTE.

To prepare electrolyte of 1.200 specific gravity ready for the battery from the full strength acid, proceed as follows: Procure a wooden tank, lead lined if possible, and of a suitable size for the quantity needed. After thoroughly washing it out, using distilled water for the last rinse out, if possible, fill it up to, say, two-thirds full of distilled water. Then pour the acid in very slowly until the specific gravity reaches a value of about 1.170 or 1.175. The mixture will now be hot, and after allowing it to cool off somewhat, it will be found that the density will have increased to about 1.200; the final adjustment can now be made, adding acid to increase, and water to lower the density. The electrolyte can then be put away in clean carboys, stoppered and stored till wanted.

When taking the batteries asunder for cleaning purposes, the electrolyte may be saved for further use, though the practice is not to be recommended, and it is better to throw it away and substitute fresh electrolyte when putting the batteries into commission again. But if it is desired to do so, it can be done by what is known as "decantation." Pour the electrolyte from the jars into a carboy, taking care not to disturb any of the sediment left in the bottom of the jars, then after allowing the acid to stand a while in the carboy (in order to precipitate any further sediment which may have been carried over suspended in the liquid), pour it into another carboy, leaving any further sediment behind in the same way. Do this, say, two or three times, when the acid may be stored for future use as required. Of course, the acid lost will have to be made up each time from the stock when the battery is being put into commission again.

TESTING ELECTROLYTE FOR IMPURITIES.

Following are given a few tests for the detection of some of the more important impurities which may exist in the electrolyte, either from impure acid at the start, or through substances such as rust, copper wire, mercury from broken thermometers, hydrometers, etc., falling into the battery afterwards, or through impure water being used for dilution purposes. These tests will not show the *amount* of, but rather the *presence* of, such impurities. The cost of the apparatus and reagents is small, and their careful use may save the initial expense many times over. After studying them out, I would recommend strongly that some of the electrolyte be taken and adulterated with each of the substances and be tested for, and to follow out the tests carefully several times over in order to become perfectly familiar with the reactions; each time making the amount of the adulterant added very much smaller, for in actual practice it will be found that this amount is very small indeed. Now it may happen that many readers of this article will have their own pet tests, but as the series is not intended for experts, but rather for those who have not had technical training and experience, the expert can pass over the following paragraphs:

The apparatus required includes six test tubes about 4 or 5 inches long. These are very fragile and must be handled with care, being usually kept in an upright position in a stand which can be readily made of soft wood.

Nitric acid, chemically pure, 2 ounces, in a glass-stoppered bottle.

Liquid ammonia, chemically pure (s. g. .880), 2 ounces, in a glass-stoppered bottle.

Peroxide of hydrogen, 4 ounces, in a glass-stoppered bottle.

Solution of potassium sulphocyanide, ½ ounce in 7½ ounces of water.

Solution of limewater, 10 grains of unslaked lime in 8 ounces of water.

Solution of potassium iodide, ½ ounce in 7½ ounces of water.

Solution of nitrate of silver, 3 drams in 8 ounces of water.

One book each of red and blue litmus paper, for testing solutions to find out whether they are of an alkaline or an acid nature.

To do this tear off a small piece of the blue paper and insert it in the liquid to be tested, and if the solution is acid the blue color will change over to a red color. Conversely the red paper will turn blue when inserted into an alkaline liquid, such as ammonia, soda, etc. When both papers do not change color at all it can be assumed then that the liquid is neutral.

In some of the following operations it will be necessary to boil some of the solutions. To do this make a wire clamp, which will hold the test tube, and with it hold the test tube over a gas burner—a Welsbach or Bunsen burner is the best. Hold the tube slantwise in order to allow for circulation of the liquid, and not too close to the flame, or the tube may crack.

TO TEST FOR IRON.

To test for iron, quarter fill a test tube with acid, add, say, six to ten drops of strong nitric acid, then add twice as much more of ammonia and allow to stand for an hour or so. If iron is present it will be indicated by a brown sediment in the bottom of the tube by the end of that time. A much more delicate test is obtained by the following method: Take some of the acid, quarter fill the test tube, and neutralize it by means of ammonia, so that pieces of the red and blue litmus paper inserted in it will both become of the same neutral shade; if both turn red it indicates that there is still some acid left, and more ammonia must be added; if, on the other hand, the papers turn blue, the solution is too alkaline and some more acid must be added. Then add six to ten drops of peroxide of hydrogen and heat the test tube over the burner till the mixture boils, keeping it boiling for about three minutes. Now add a few drops of a solution of potassium sulphocyanide, and if any iron is present the solution will turn red.

To test for copper, add some diluted ammonia water to a sample of the electrolyte and if copper is present the mixture will turn a bright blue color. Take care, however, not to add strong ammonia to strong acid, for such a mixture is likely to explode.

TESTS FOR MERCURY AND CHLORINE.

To test for mercury, half fill two test tubes with acid, then add to one some lime water, and to the other some potassium iodide solution; if mercury is present in the former case the solution in the tube will turn black, and in the latter a yellowish green color, and after being allowed to stand for a while will throw down a precipitate in each of the tubes of their respective colors. Thus one test checks the other, although it is not necessary to use both.

To test for chlorine, nearly fill a test tube with diluted acid, then add a few drops of the nitrate of silver solution; if chlorine is present the solution will turn white and throw down a deposit of chloride of silver. If the tube is now placed in a strong light this precipitate will become of a violet or purple shade.

There are several other impurities that are occasionally found in batteries, or in the electrolyte, the tests for which involve the use of other apparatus and some chemical skill. Consequently, if the presence of these impurities is suspected because of low battery capacity, loss of voltage, or the like (the previous tests having failed to disclose the exact cause, and the trouble not being of electrical origin), it is best to refer the matter to the battery maker without delay.

(To be continued)

THERE IS ANNUALLY EXPENDED on the town or lateral roads of the country $55,000,000 in cash and $20,000,000 in labor.

IN 1898 there were not more than two hundred automobiles made and put into use in the United States. In 1909 the total number of automobiles made and sold in the United States will approximate 82,000.

THE HORSEPOWER of which the average American pleasure car produced this year is capable is about twenty, the 82,000 machines to be marketed in this country making an aggregate of 1,640,000 horsepower. At the beginning of this year there were in use in the United States over 184,000 automobiles, capable of close to four million horsepower. The harnessing of water power at Niagara Falls to the extent of a few hundred thousand horsepower was hailed as a stupendous accomplishment.

CONSIDERING THE PASSENGERS carried per mile by railroads in the United States in 1908, as compared with the number of people carried per mile by motor vehicles, we find that in the same time and territory, automobiles furnished seven-tenths of one per cent. of the number of passenger miles the railroads furnished. What will the relative percentage be in 1915?—Herman F. Cuntz.

AEOLIAN COMPANY DISCARDS HORSED VEHICLES

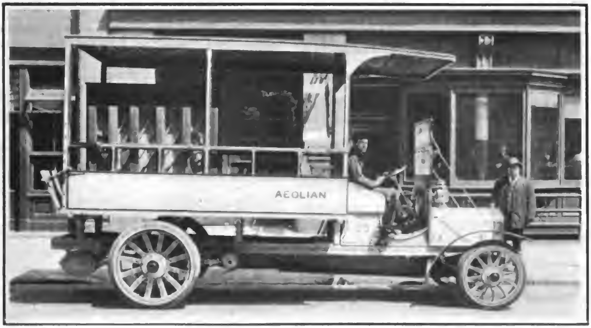
Decision Reached to Use Motor Vehicles Exclusively After an Exhaustive Trial of Machines Extending Over Four Years--Details of the Electric and Gas Motor Vehicle Delivery Department

AFTER a thorough trial of commercial motor vehicles, extending over a period of four years, the Aeolian Company in New York sold its last remaining horse in June. In future every delivery for this progressive company will be made by machine. This decision as it affects the practicability of the motor vehicle for severe delivery service, from the viewpoint of the successful merchant, is of very great importance to the industry at large. The Aeolian Company has a reputation for leadership in its line that reaches even far beyond the borders of the United States, and the business skill that has placed its self-playing pianos and organs in homes the world over may be safely credited with ability to select such methods of local delivery as will be efficient and profitable. The decision is especially noteworthy on account of the previous experience of the company with horse equipment. Had this been of an inferior character, or badly handled, the complete change to machine methods might be considered a makeshift. On the contrary the company has been noted for the excellence of its horse equipment, which was probably unsurpassed in New York City. At horse shows and workhorse parades the company's entries were regular competitors and were as regularly rewarded by prizes for general excellence. The same high standard of excellence was maintained in the housing and upkeep of the horse equipment; the stable on East Thirty-second street was a model of neatness and healthfulness.

COMMENCEMENT OF MOTOR SERVICE.

The start in the direction of motor transportation was made about four years ago by the purchase of a medium weight electric truck, intended to carry two or three pianos and four men, a total load of about 3,000 pounds. The capabilities as well as the limitations of this machine were determined by careful observation, and the vehicle is still in regular service making local city deliveries. The next step in the development of the motor vehicle equipment was the purchase of several gas motor delivery wagons of about 3,000 pounds load capacity. These were of an early type fitted with horizontal motors, and, although repairs and replacements were not infrequent, the service obtained from their use helped toward the final adoption of motor delivery exclusively. Some of these machines are still in the company's service, being used rather as emergency vehicles than for the regular hard daily deliveries. A subsequent purchase was a machine of about two and a half ton load capacity which could haul four or five instruments with a gang of movers; and later still two other large gas motor machines were purchased and have been in regular service for more than a year.

Having learned by experience just what were the requirements of a satisfactory motor delivery service, the company recently decided to altogether abandon the horsed vehicles and to install three Sauer gas motor trucks and eight Studebaker electric vehicles. A complete change of the stabling facilities is in progress in the Thirty-second street building, from which all evidences of the horse are now being removed and replaced by the most modern garage equipment. This includes a complete electric-charging apparatus for eight vehicles.



SAUER TRUCK ADOPTED BY AEOLIAN COMPANY FOR HANDLING PIANOS IN SUBURBAN DELIVERY

SAUER MACHINES INSTALLED.

The accompanying illustration shows one of the Sauer machines which have been adopted as standard for the gas motor vehicle equipment. This truck has a capacity of five tons and is equipped with a four-cylinder vertical, water-cooled, motor-in-front under a bonnet; multiple disc clutch; four speed selective gearset; 42-inch rear wheels and air-brake and self-starter. The electric vehicles to be used in the delivery of pianos will include three 1-ton, two 1 1-2-ton, one 2-ton, and one 3 1-2-ton Studebaker machines. The company will also install a 1-ton Studebaker electric for the delivery of music rolls, known as the "Library Service."

The delivery department of the company is in charge of Mr. Charles E. Wirth, and many of the present employees in this department have been with the company since the inception of the motor truck trials. The headquarters of the company are in Æolian Hall, on Fifth avenue, between Thirty-fourth and Thirty-fifth streets. Deliveries are made direct from the New York store, not only in the city proper but for the residential communities of New Jersey, Long Island, Westchester County, and Connecticut, lying within a radius of 50 miles. The management estimates that the deliveries which can be made by one of the gas motor trucks would have required not less than fifteen horses, with a corresponding number of drivers, wagons, and piano handlers.

ELECTRIC VEHICLE CO. SOLD

Authority was granted by the United States Court at Trenton, N. J., on June 14, for the receivers for the Electric Vehicle Co. of Hartford, Conn., builders of electric trucks and gasoline and electric pleasure vehicles, to sell the assets of the company for $430,000 to a reorganization committee represented by Herbert Lloyd, Kenneth B. Schley and C. Wendell Woodward. The order was subject to confirmation by the Federal courts in Connecticut.

The offer made by the committee included an agreement to pay all of the accruing debts of the present receivership until its termination and the turning over of the property by order of the court of final judgment.

The sale will permit of a settlement with all bondholders on the basis of 20 cents on the dollar. The company was incorporated in New Jersey with $20,000,000 capital stock, most of which was issued. The company has been in the receiver's hands since last December.

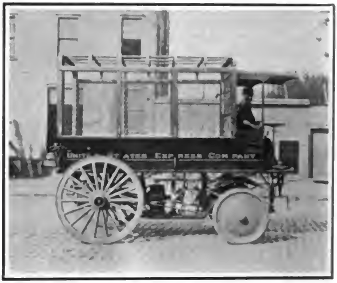
A certificate of incorporation has been filed with the Secretary of State of Connecticut for a new company to be known as the Columbia Motor Car Co. of Hartford, with authorized capital stock of $48,000. The incorporators are bondholders of the old corporation, Lucius F. Robinson, Albion B. Wilson and Francis W. Cole.

SAVING THE OLD EQUIPMENT

An obstacle that stands in the way of the adoption of motor delivery service by many large concerns to-day is the inability to dispose of the present equipment of horses and wagons—particularly of the vehicles—without a great loss on the investment in them. It is easier for a new enterprise, such as a large department store that is just opening, to install a complete service of self-propelled commercial vehicles than for an old-established business to make a change from one form to the other.

This fact has been realized from the very first, and several fore-carriages have been brought out, beginning as far back as 1898, to be connected up to the regular horse-drawn wagons in place of the front wheels and axle. For various reasons these have not proved commercially successful. In the accompanying illustration is shown the latest attempt to adapt the horse wagon to motor propulsion, and if it continues to be as successful as it has been so far, it is likely that the United States Express Company will transform more than 100 more of its wagons in the same way.

For the front wheels, axle, fifth wheel and tongue of a regular two-horse screen express wagon, the New York office of the company substituted a pair of Couple-Gear front wheels of the same size and type as used on the one-ton trucks. They were bought from the Couple-Gear Company of New York, and were complete with axle, steering gear, controller and the necessary connections.



GAS-ELECTRIC OUTFIT FOR HORSED VEHICLE

On a cradle hung from the body of the wagon were mounted a 15-horsepower, air-cooled motor of the double opposed type and a direct connected 5-kilowatt electric generator to supply current to the two electric motors carried within the steel front wheels. The high, steel-tired rear wheels were left in place, as shown.

This outfit has been making a speed of 16 miles an hour, light, on good roads, and running up and down all sorts of hills in the bad road sections of New Jersey. During the latter part of June it was put into city service in New York between Cortlandt street, in the downtown congested part of Manhattan, and Harlem, uptown. Upon its performance on these city routes will depend in large measure the action of the express company in transforming more than 100 other wagons in the same way.

The Columbus, Ohio, District Nursing Association has ordered an unique motor refrigerator for the distribution of milk to the babies of the city. Some time ago Foster Copeland hit upon the plan of securing a motor car, equipped with a refrigerator capable of carrying a large number of gallons of sweet milk. A subscription was taken of the philanthropic people of the Buckeye capital, with the result that sufficient funds were pledged. The car is now being built and will soon be delivered by the factory.

LUBRICATION OF GASOLINE VEHICLE MOTORS*—II

A Practical Discussion of the Subject, Including Consideration of the Friction of Solids and Liquids; Troubles Arising from Carbon Cylinder Deposits; Liquid Lubricants and Means for Their Application to Motors

J. W. G. BROOKER, F.I.C.

THE causes of carbon deposit are numerous, and I do not intend to endeavor to cover them all; additions to my list I hope will be brought out in the discussion. The fit and design of the piston and the piston rings are, of course, among the chief factors to be considered.

When the lubrication is by splash the temperature of the crank case is another factor in the question. The oil is heated unnecessarily when the crank case is too hot, and in this condition it is more freely splashed, and it will also more readily get past the piston rings. In the majority of true force feed lubrication systems the pistons rely for their supply on what is splashed off the big ends and crank webs as they revolve, and even if the oil is hot, and therefore thinner, very little more circulates and is thrown off than when it is comparatively cool. With a properly designed force feed lubrication system, however large a quantity of oil is in circulation, it is practically impossible for the pistons to be much too liberally supplied. Their supply is confined to what is thrown off the big ends and crank webs, and this is limited by what emerges from the bearings.

Oil is mainly consumed in two ways: leakage at the bearings, joints and tappets; burnt in the cylinder. The cure of the first is obvious, although it is a matter that is not always attended to; the second cause of diminution can be checked by limiting the amount splashed. This is done in the various force-feed methods. It is obvious that by checking the amount consumed one is also diminishing the rate of formation of carbon deposit.

The purity of oil used is, of course, of considerable importance. The aim of the conscientious oil merchant is directed towards the production of oils containing the minimum amount of constituents likely to decompose readily directly they are heated. Decomposition is the first step towards carbon deposit, and the non-volatile decomposition products constitute the greater part of the carbon deposit in a cylinder. When these are first formed they are not exactly carbon, but they rapidly become so by exposure to the heat of the interior of the cylinder head.

Even the best possible cylinder oils contain small quantities of bitumen and tarry matter, and these are the first to be attacked by the flame. The true oil is to a large extent distilled out of the cylinder unchanged. Of course, I am referring only to the proportion that gets past the rings. The deposit is largely augmented by mineral matter, mainly dust from the road, brought into the cylinder with the charge; also by carbon deposit from incomplete or imperfect combustion of the gasoline.

Although, strictly speaking, outside the scope of this paper, it may not be without interest to very briefly refer to the formation of carbon deposit from the combustion of gasoline. It comes about in two ways chiefly. Either from the overloading of the charge with gasoline, or from the imperfect spraying and diffusion of the fuel in what is otherwise a properly proportioned mixture. The perfect charge is one in which there is a slight excess of air, and throughout which the gasoline is completely diffused as vapor. The charge may leave the carbureter in the perfect condition, but on the way to the engine, contact with cold surfaces and bends in the pipe may cause condensation and partial precipitation of the gasoline in the form of drops. These are swept into the cylinder with the charge, and so rapid is the explosion stroke that they are incompletely burnt and carbon is, as a result, one of the products of combustion. This is deposited in the form of soot in the cylinder and silencer. The cooler the induction pipe and cylinder the greater will be the tendency for the gasoline to condense into drops. It is claimed by some that on the compression charge whatever liquid gasoline there is in the cylinder will be vaporized by the rise in temperature. Against this, however, must be set off the fact that the result of compression is to raise the boiling point and therefore reduce the tendency to vaporize.

Reverting now to the combustion of charges over-rich in gasoline, we have the previously mentioned unfavorable conditions in an aggravated form. Air at any particular temperature can only hold a certain and definite amount of gasoline as vapor. Raising the temperature permits more to be carried and lowering the temperature has the reverse effect, viz., causes the precipitation as a liquid of part of what is being carried. If a very large volume of air swept past a small jet, all the gasoline that issued would be caught up and readily carried as vapor to the engine, particularly if the air was warmed. If, however, on the other hand, the volume of air was less but the quantity of gasoline was greater, it would be a toss up all the way from the carbureter to the engine whether the whole of the gasoline would arrive at the engine in the form of vapor, or whether it would partly condense into drops.

To increase the odds in favor of the gasoline remaining as vapor, we must warm the air and keep it warm; we must thoroughly break up the gasoline spray in the air; and we must eliminate cold surfaces and sharp turns and elbows in the induction pipe which will cause condensation.

An over-rich mixture can be looked upon as a mixture of three things: (1) Air; (2) correct amount of gasoline for proper combustion, existing partly as vapor, partly as drops; (3) extra gasoline in the form of drops. In the course of combustion there is insufficient air to burn completely all the drops of gasoline into carbonic acid gas and water, with the result that much of what is not consumed is left in the cylinder as carbon.

The above has for long been a favorite subject for discussion and the reported use of pure castor oil in the high piston speed engines of many of the racing and hill-climbing cars in France last year has stimulated interest in the matter. It is obvious that the use of a pure fatty oil such as castor is out of the question for general motor lubrication. It is comparatively expensive, the smell from the exhaust is obnoxious; but the chief objection is its tendency to gum on the bearings and all exposed surfaces. This thickening due to oxidation is more or less a pronounced feature of all fatty oils. Some, such as linseed, change rapidly even in a few hours under favorable conditions, while others, such as castor and rape and olive, classed as non-drying oils, are very slow to oxidize; but still there is always the tendency to change, particularly when hot and in a current of warm air. However, where the car is being frequently dismantled and cleaned, as in the case of racing engines, the slight oxidizing tendencies of non-drying oils are negligible. One of the chief features of the fatty oil is its ability to stand high temperatures, without decomposition or appreciable thinning. Under similar conditions mineral oil would be reduced to a thin liquid almost useless for lubrication unless a large quantity were used. When a very high piston speed is adopted it is of the utmost importance that the piston be able to slide with the least possible resistance of the nature of fluid friction. It has been found that the peculiar and characteristic greasiness of the fatty oil is the only thing that meets the conditions of low fluid friction combined with high lubricating value.

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*From a paper read at the Royal Automobile Club Associates' headquarters in London.

Another feature of the fatty oil is its scouring or cleansing properties. There are several makes of oil engines working with a kerosene fuel on which a compound oil or pure fatty oil is necessary. When an attempt is made to run them with a pure mineral lubricant the rings and valves rapidly get gummed up with sticky, partly carbonaceous deposit, that renders starting from cold almost impossible. In a very short time the engine requires dismantling and cleaning. Kerosene oil fuels at their best are not easy to vaporize and burn properly in a cylinder, and the gummy deposit appears to come partly from incompletely burnt fuel and partly from the lubricant. When, however, fatty oil or a blend of fatty oil with hydrocarbon oil is used, the products of incomplete combustion seem to be dissolved by the lubricant, with the result that the piston rings and valves keep clean, also the rate of formation of carbon deposit is much slower. I am inclined to think that in these instances the compound oil is to pure mineral oil as soapy solution is to pure water.

As previously mentioned, the use of pure fatty oil for general motor lubrication is out of the question; but there is a good case for the compound oil, which is a blend of pure hydrocarbons with fatty oil, the former usually predominating in the mixture. In the first place, the mineral oil present appears to practically eliminate the tendency of the fatty constituent to oxidize and thicken; which, of course, removes one of the chief objections raised against the use of fatty matter for lubrication. In the second place, it is quite reasonable to assume that the lubricating value of a mineral oil is improved by the addition of that fatty oil which by itself has been shown to possess the very highest friction-eliminating properties.

And, thirdly, it is also no stretch of the imagination to look on the gasoline engine as somewhat akin to the oil-fuel engine, and that what is sauce for the goose is sauce for the gander. In other words, the compound oil, which is a necessity to the oil engine, will also be better than pure mineral oil for the gasoline engine. At the same time it must be added that the average gasoline engine will run satisfactorily with pure hydrocarbon lubricant, and that it is only when the best results are required, either from normal engines or from special high-speed engines, that the richer oils are essential.

The methods of lubrication of gasoline motor vehicle engines appear at first sight very varied; but they can really all be divided into one of two classes, "Splash or Spray" and "Forced Feed." The simplest method of all is the oil bath in the crank case, into which the big ends dip and splash the oil over every moving part. In this, as in all the splash or spray systems, the oil arrives on the outside of the bearing, and it has to find its own way in. In the case of the forced feed method, on the other hand, the oil is introduced into the center of the bearing between the journal and the brasses and the pressure of a pump driven by the engine helps it out. I understand that in the Lanchester engine, for instance, the pressure of the oil in the system is 30 pounds to 35 pounds to the square inch. On the Rolls-Royce, De Dion, Lanchester, and several other cars the system has been carried out to the fullest extreme. The oil, after being filtered, is forced by the pump to each of the main bearings; from these it travels through holes drilled in the crank shaft to the crank pins. A portion emerges at the big end bearing, and in doing so lubricates this important member, while the remainder of the oil travels up the hollow connecting-rod and supplies both the cylinder wall and the wrist pin bearing. The oil drains back from all parts into the well, is drawn through a filter, and is then ready for another journey of usefulness.

On the Vauxhall engine, which is considerably smaller than those just mentioned, the forced circulation comes to an end at the big end bearing, and the piston and wrist pin rely for their supply upon what is flung from the revolving crank webs. This is adequate for medium-powered engines, and the extension of the system to the wrist pins can be considered as a refinement for large engines. On several types of the Austin car two complete systems are installed—viz., the true forced-feed method for the crank shaft and connecting-rod bearings and a drip feed from the dashboard to the cylinder walls. The forced-feed system uses the same oil over and over again, which is adequate for the bearings, while a small pump supplies drips, which can be regulated, feeding fresh cold oil direct to the cylinder walls.

Reverting now to the splash system, I am inclined to consider the Siddeley arrangement the most efficient and simple. It is briefly as follows: A pump, driven from the cam shaft, keeps four troughs, one for each connecting-rod, overflowing with oil. The troughs are built across the crank-case each one in the path of its particular connecting rod. The big end is fitted with a copper scoop, which, as it comes to the lowest point in its travel, dips to the extent of about one-quarter inch in the oil in the trough, creating a splash. The more the copper scoop is adjusted to dip the greater the splash, and it is only a matter of experiment to determine once and for all what the extent of the dip must be to give adequate lubrication without excessive smoking and carbon deposit. The effect of the scoop continually striking the oil in the trough is, of course, to empty it, and to balance this the before-mentioned pump keeps up a continuous flow into the canal, tending to keep it full, The pump is more than sufficient to accomplish this, with the result that the canal is always overflowing. The great feature of the system is the absolute uniformity of the depth of dip under every condition, and, as far as I am aware, this is not obtained with any other method of lubrication by splash. Like everything else, it has its weak point; but it shares it with many other lubrication devices, and it is not a serious matter.

The difficulty is this, that the adjustment of the depth of dip of the scoop is set for oil of a certain viscosity, with the result that the use of lighter or heavier oils gives less or more lubrication, respectively, than the mean. As the viscosity of the oil used is increased, so the depth of dip must be reduced if the degree of lubrication is to remain constant. If a lighter oil than the standard is used, then the scoop should dip deeper. There is, however, a more important reason why neither heavy nor light oil should be used, and it is that the medium-bodied oil is preferable for the engine, and the scoops have been adjusted accordingly. An interesting point cropped up in the course of the preliminary tests with this system. One big end was found to be wearing faster than the others, although its particular trough was all in order. It was proved ultimately that the very slight accidental doubling over of the edge of the copper scoop was the cause of the bearing being starved. The scoops are now examined before despatch to see that they have sharp cutting edges to strike the oil.

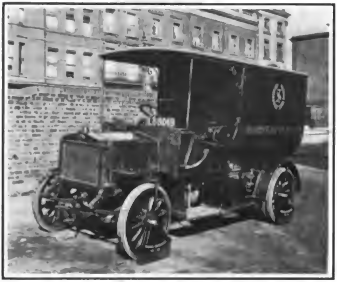
Variations in methods of splash lubrication are mainly variations in the methods adopted to feed the oil to the crank case. After it has reached the crank case it spreads itself, in the case of four cylinder engines, into four divisions, one for each of the four big ends, which dip and create a splash. This arrangement minimizes the tendency for the oil to run to one end or other of the crank case as the engine tilts up or down. The question therefore resolves itself into discussing the different methods of supplying the crank case, and, needless to say, every instrument claims to do so in the most regular and reliable manner. The varieties in use include dredgers, plunger pumps, drip feeds utilizing air pressure or exhaust gas pressure, and mechanical lubricators. With most of these lubricators the oil is fed direct to the cylinder walls and main bearings, from which it drains to the crank case to provide a bath for the big ends.

A system differing somewhat from any other is the "spray" lubrication of the Spyker engine. In this a plunger pump sucks oil through a filter from the pump, and forces it under pressure through pipes, from which it emerges with considerable impact against all the revolving parts and on the cylinder walls. The oil ultimately drains back to the well, ready to be used again. It seems to me that, with the pump and the pipes handy, very little more expense would have been necessary to install the true forced-feed system.

It is stated on good authority that at the present increased rate of consumption the domestic supply of high-grade iron ore will approach complete exhaustion by the middle of the present century.

LONDON DRY GOODS DELIVERY

Modern methods of conducting a great department store adopted by Selfridge & Co., Ltd., of Oxford street, London, have caused a great deal of discussion in the British metropolis. Our readers will recall that this concern takes its name from the principal owner, who is an American and was formerly manager of the great retail store of Marshall Field & Co., in Chicago. Motor wagon delivery is one of the up-to-date features of the management of the London store, one of the closed delivery wagons used being shown in the accompanying engraving. This vehicle was supplied by Halley's and it will be noted that its construction is exceptionally strong, evidently intended to withstand constant hard usage. An indication of this is shown in the construction of the wheels, which are very much heavier than is usual in wagons of this type. A feature of the equipment, shown in the photograph, is the splash guard fitted to the wheels nearest the sidewalk. As English vehicles are driven on the left side of the road the protection is only needed on the left side to prevent the splashing of pedestrians with mud.



DELIVERY VAN FOR CHICAGOAN'S LONDON STORE

A new system of weights and measures is now being introduced throughout the Chinese empire. The authorities intrusted with the establishment of standards have decided the length of the foot to be 32 centimeters, or 12.598 inches.

United States Consul Alfred K. Moe of Dublin, Ireland, reports that there are openings for the sale of commercial motor vehicles in his district. He suggests the establishment of American agencies and shipment of demonstrating vehicles.

A movement has been started by the Boston *Herald* to commemorate the three hundredth anniversary of the landing of the Pilgrims and the founding of New England by a world's tercentennial exposition in Boston in 1920. New England alone, of all parts of the Union, has never had its World's Fair, and it is believed that the national and universal interest in the historic event which the exposition will commemorate will command the enthusiastic approval and support of the American people of all sections and of all classes.

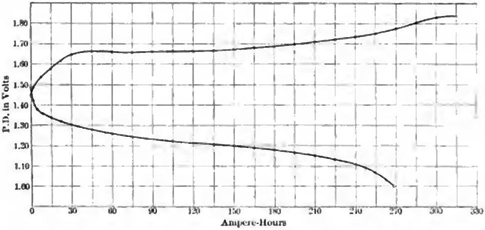
NEW TYPE EDISON BATTERY STANDS SEVERE TESTS

Results Obtained in Regular Daily Deliveries of Two of New York's Largest Retail Stores in Suburban Service--Opinions of Delivery Experts Regarding the Nickel-Iron Battery--Structural Data

EDISON CELL. TYPE "A-6."
WEIGHT 19.5 LBS.

CHARGED 7 HOURS AT 45 AMPERES.		DISCHARGE AT 45 AMPERES.	
AMPERE-HOUR INPUT	315.0	AMPERE-HOUR EFFICIENCY	85.2 %
AMPERE-HOUR OUTPUT	268.5		
AVERAGE P. D. OF CHARGE	1.692	VOLT EFFICIENCY	71.1 %
AVERAGE P. D. OF DISCHARGE	1.202		
WATT-HOUR INPUT	533.0	WATT-HOUR EFFICIENCY	60.6 %
WATT-HOUR OUTPUT	322.7		

OUTPUT PER POUND—16.54 WATT-HOURS.



CHARACTERISTICS OF THE IMPROVED EDISON NICKEL-IRON STORAGE BATTERY

FOR nearly two months past the new type Edison battery for which electric vehicle users have been waiting so long and impatiently has been undergoing tests in the regular daily service of one of the leading department stores and one of the largest drygoods establishments of New York City, the two largest users of commercial vehicles in the city with the possible exception of the Adams Express Co.

R. H. Macy & Co., who own and operate thirty-one electric delivery wagons and trucks, had a Lansden wagon fitted with one of the new batteries for three weeks, since which time it has been regularly in the service of the pioneer drygoods house in the use of motor delivery wagons in the city, a house that to-day maintains forty-one commercial vehicles, both gasoline and electric, but which as a matter of policy declines to allow the use of its name. By all who have had anything to do with the new battery it is spoken of in the highest terms of approval. But the best presentation of its efficiency will be made by telling exactly what has been accomplished with the battery in an ordinary electric vehicle.

BATTERY MADE IN TWO SIZES.

The new battery is made in two sizes, designated A 4 and A 6. The former is of the same capacity as the earlier type E 27 Edison battery, rated at 150 ampere-hours discharge. Type A 6 has the same number and size of cells as type E 27 and is of about the same weight, but has nearly double the capacity, giving 260 ampere-hours discharge. It requires a charge of 300 ampere-hours, but the users say the loss is much more than counterbalanced by the work it does and by other points of practical excellence. The smaller size battery weighs about 700 pounds and the larger size 1,200. Size A 6 is installed in a demonstration wagon of Lansden make which has been christened the *Greyhound*, for reasons that will become obvious. At the time an investigation of the performance of this outfit was made by a representative of THE COMMERCIAL VEHICLE, up to June 21, it had been running in the service of the drygoods store for nearly one month.

Upon being received it was first given a special test, in which it was run three consecutive days without recharging, and made a total mileage of 93 miles. On the first day it left New York City at 8 o'clock in the morning, crossed the ferry to Jersey City and covered the Bayonne route, going all the way to Bergen Point, making approximately 100 stops for delivery of packages. It returned to the garage at 6 p. m. The same route was covered on the second day, starting at 8 a. m., making about the same number of stops, and getting back at 5 p. m. On the third day it traversed the regular Staten Island route for the store, embracing nearly all the towns on the north end of the island, which is very hilly, and making about 100 stops for deliveries. It left the store for this trip at 8.30 a. m. and got back at about 8.30 in the evening. During this entire period the battery received no "boost" and was not recharged. At the end of the test the voltmeter reading showed 60 volts.

SEVEREST ROUTE IN CITY

Following this initial test, the *Greyhound,* with battery A 6, was put on the Coney Island route, which is claimed to be the worst or longest and hardest covered regularly in one day of any served by any dry goods house in the city. It is from 63 to 67 miles long and averages 150 stops for deliveries, sometimes running up to nearly 300 deliveries.

In covering this route, the *Greyhound* leaves the store in New York City at 8 o'clock in the morning, crosses the Brooklyn Bridge, and thence runs out Fourth avenue to Sixtieth street, where deliveries begin. From there it goes to Fort Hamilton, making deliveries along the way, returns to Dyker Heights, then does part of Borough Park. From Borough Park it delivers all the way down to Bath Beach, taking both sides of the main line, thence through Bensonhurst to Ulmer Park and on down to Coney Island. It covers Surf avenue, in Coney Island, all the way to Sea Gate, at the westerly end. Returning, it goes to Brighton Beach, then cuts over to Sheepshead Bay and starts on the homeward trip, coming back through Flatbush, where it finishes its deliveries, and re-enters Manhattan Island by way of the Williamsburg bridge. The wagon usually arrives at the garage about 7 p. m.

If there are an unusual number of deliveries to be made the driver is accompanied by a boy to carry packages, but otherwise he is alone. It is an enormous day's work to be done week after week, but the driver likes it because he gets back from his work about three hours earlier than when horses were used. One reason why it is possible to make so many deliveries on such a long route in so short a time is because, unlike the city routes, there are no stairs to climb to upper floors of apartment and flat buildings. Often the customers see the motor wagon stop in front of their residences and come out to receive the packages, without waiting for the doorbell to ring.

When this route was covered with horses, two teams were used every day and hampers of packages were shipped by express to Bath Beach, about midway of the delivery route, where the wagons called for the packages and began their deliveries. Very often the wagons could not start delivering until 10 a. m.

CHARACTERISTICS OF THE "GREYHOUND"

The *Greyhound* is a one-ton wagon of the regular Lansden type. It weighs 2,460 pounds empty, without battery, and 3,660 pounds with battery; that is, the type A 6 battery weighs 1,200 pounds. The wagon averages about 11 miles an hour actual running time.

The smaller battery, type A 4, has been in use by the same house in one of its two-year-old Lansden 1,000-pound wagons since June 1. In order to test it out, it was first tried on the Coney Island route, already described. It covered 45 miles over heavy, muddy roads, making 175 stops for deliveries, before the battery charge gave out. This showed that it was incapable of serving this route, however, so it was put on the Bayonne route, running down to Bergen Point. It has regularly served this route ever since, covering an average of 43 miles a day and making 125 stops. The voltage reading of the battery after the day's work shows that it is capable of doing 50 miles a day under the same conditions. The wagon leaves the store about 8 a. m. and gets back to the garage at 5 to 5.30 p. m. It is not given any boost during the day—in fact, the drivers are not allowed to boost the batteries in any of the cars. This small battery contains 65 cells and weighs about 700 pounds.

Various characteristics of the new battery are commented upon by the superintendent of the garage and others connected with the management of the store under whose direct observation the work of the delivery service comes. The most important is the uniformity of discharge capacity regardless of the age of the battery. This is the chief characteristic, perhaps, of all Edison batteries, as the dry goods house has one of the early ones (type E 27) that has been in its service for nearly five and one-half years and is to-day regularly doing 35 miles a day. Practically no other work has been done on it in that period except to recharge it with potash every six months, and of course to keep the cells filled with distilled water. This quality, it is pointed out, is of great value, as it relieves the superintendent of deliveries of the mental effort of remembering the capabilities of each battery according to the time it has been in use, so that a battery capable of doing, say, 20 miles, will not be put on a route 30 miles long and get stalled on the road.

LITTLE HEAT DEVELOPED ON CHARGE

Another quality is that the battery does not heat up much in charging, resulting in lessened evaporation and less frequent refilling. There is no testing with a hydrometer daily, and no use of acid, all that is required being the filling of the cells with pure water, as the potash does not evaporate. The reason for the lessened heating is said to be due in part to the large air space between cells.

During the three weeks that the Macy department store had the *Greyhound,* it was given severe tests over a number of different routes into the suburbs. For example, on April 16 it went to Coney Island, making about fifty deliveries, and on the same day, without recharging, it ran to Woodlawn and back. Then, to completely discharge the battery, it was run about 10 miles in nearby deliveries in the neighborhood of the store. The distance covered during the day was between 87 and 90 miles. The charging plug had been taken out at 8 a. m. and was not put in again until 3.30 a. m. the following day.

On May 5 the wagon was sent to Morristown, N. J. Leaving the store at about 8 a. m., it covered 72 miles out and back, up hill and down, over macadamized roads, making forty-five stops for deliveries, and returned to the garage by 9.30 p. m., or two hours before a team of horses would return to the stable in Newark after serving the same territory in Morristown.

On another occasion the Staten Island route was served, including Tottenville, at the extreme southerly end of the island. Owing to the hilly nature of the roads there it is asserted by the manager of the garage that 50 miles on the island is equivalent to 80 or 90 miles over level, smooth roads. Yet the wagon covered the route, making sixty stops for deliveries, and returned, running strong, in about five hours less time than the same deliveries could have been made with two or three teams of horses.

ROUTES IN MACY SERVICE

During the three weeks that Macy's had the wagon fitted with the new A 6 battery the machine was reunlarly put on the longest routes, serving suburban territory that usually is handled by horses and wagons or by express. Besides the Tottenville route, which is 56 miles long, there was covered the trip to Richmond, also on Staten Island, 48½ miles; Scarsdale, in Westchester County, north of the city, a round trip of 43 2-10 miles; Coney Island, and others, in rotation.

The wagon was regularly worked 14, 15 and 18 hours a day, according to the chief engineer and garage superintendent of Macy's, and averaged from 56 to 57 miles a day on one charge without ever having a boost, and regularly returned still good for 10 or 11 miles more. It was regularly recharged at night for six to seven hours at a 40 ampere-hour rate.

The delivery experts state, without reservation, that the battery is easily capable of serving the longest and hardest delivery route operated out of New York City and of surpassing the physical endurance of the driver; that is, no driver, even with the aid of a boy, could drive the machine day in and day out over a longer route and make more deliveries than the *Greyhound* is capable of doing.

There can be no question that those who have had supervision of the work of the battery are enthusiastic regarding it. They admit that the first cost is high, comparatively, but as an offset to this, point out the low cost of maintenance over a term of years; and in continuous service of any sort the original investment in necessary apparatus is only one item in the expense account.

DETAILS OF NEW NICKEL IRON BATTERY

The improved type of Edison battery has been under test and observation for a long time in vehicles connected with the maker's laboratories before the sample batteries here discussed were put into ordinary commercial service. These were put out so that the performances, which had quite satisfied the Edison experts, could be verified under the ordinary conditions of trade.

The new "A" type battery differs from the older Edison battery in the mechanical construction of the positive plate and in the substitution of pure nickel for the graphite formerly used. The general form of the battery and shape of the plates has not been altered. The negative plate is still composed of the little nickeled steel boxes, of rectangular section, filled with oxide of iron. In the new positive plate, however, the active material is contained in nickeled steel tubes, about the thickness of a lead pencil and about 4 inches in length. These are formed spirally out of strips of perforated ribbon steel, nickeled, and are reinforced by nickeled steel rings, spaced about ½ inch apart. The tubes contain alternate layers of nickel oxide and pure metallic nickel, loaded under mechanical pressure. The ends of the tubes are crimped, forming a flat at each end which is held fast to the frame of the positive plate by notched strips on the plate which are turned over under hydraulic pressure. The result is a very stiff plate which one could throw clear across a battery room with very slight chances of even bending the plate. The electrolyte is composed of a 21 per cent. solution of caustic soda, as formerly. Aside from the cells a new form of battery crate has been adopted, with bent corners instead of dovetailed, making a very light and stiff construction. The general mechanical finish of the new battery is quite up to the engineering excellence of the older type.

PATROL SERVICE IN TRENTON, N. J.

Last August the Trenton, N. J., Police Department found it necessary either to add another station or secure other means beside the horse-drawn patrol wagons to properly cover the rapidly enlarging city. Extensive investigations induced them to purchase a White car, and since its introduction last October the new steam patrol wagon has not only handled the increased calls but also has done the work formerly performed by the central and outlying station wagons. This change has resulted in a material decrease in the operating expense of the Police Department, inasmuch as the eight horses formerly used to draw the former wagons have been sold, ten men necessary to care for and drive them dispensed with, and the stables and space occupied by the old patrol wagons used for other purposes. Not only does the White wagon answer all regular calls, but, in addition, it is used to carry the prisoners from the jail to the court house and from there to the prison on the outskirts of the city; it answers all second alarm fires and many ambulance calls. With a view of filling a demand for the last-mentioned work, a false floor is fitted, and beneath that is placed a stretcher, the side seats in the wagon folding down to allow room when used for ambulance work. A regular "first aid kit" is carried, and just back of the driver are side doors to allow a nurse or doctor free access to the patient in addition to the regular rear entrance.

WHITE PATROL WAGON FOR TRENTON, N. J.

Three drivers working in eight hour shifts, look after and drive the machine, and since it has been placed in operation between twenty-five and thirty calls a day have been averaged. Seven gallons of gasoline amounting to $1.05 a day are used and 5 gallons of cylinder oil costing $3 is the average for the month; so far, no repairs have been necessary owing to the care and proper attention the car regularly receives.

No odometer has been fitted to the machine so that the authorities are not able to furnish mileage; they are enthusiastic over the work performed and regret such a machine was not used long ago.

FROM JANUARY 1 TO APRIL 10, 1909, the police records show that in New York City there were 434 vehicular accidents. Of these 162 were due to street cars, 102 to wagons, and 90 to motor vehicles. The remaining accidents were caused by horsedrawn trucks, 53; horsedrawn cabs, 12, and trains, 15

RENARD GAS MOTOR TRAIN

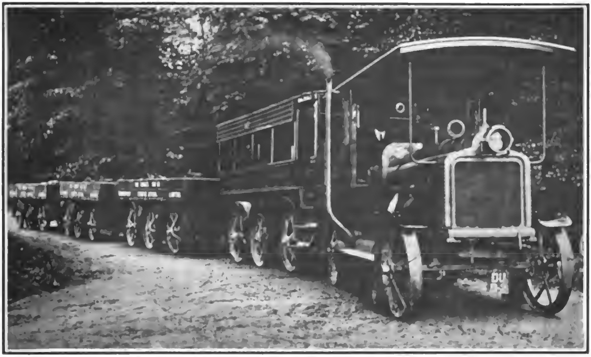
Mention has often been made of the Renard road train in our past issues and our readers are conversant with its peculiarities. It will be remembered that each vehicle of this train is mechanically propelled by its own driving wheels, without hauling or trailing, and that there is only one motor to a train; the power applied to the driving wheels of each unit being derived from a universally jointed line shaft extending the whole length of the train. To keep this propeller shaft in proper alignment it was necessary to devise special steering connections between the different vehicles such that they would strictly follow each other in the same track as if running on rails.

This invention was the property of the late Commander Renard of the French army, a former associate of Commander Krebs, now of Panhard fame, in technical work for the French war office. The entire rights have now been taken up by an English corporation, which exploits and develops the system. The vehicles are made by the English Daimler Motor Company, Ltd., for the whole world save those for France, which are made near Paris in the original Renard shop.

At the recent Franco-British Exhibition in London were shown two trains intended for service in India, and they were daily running on the exhibition grounds for demonstration purposes. One, which we illustrate, is a freight carrying train, with one passenger car, fitted with third-class accommodation, and the other is an all passenger train, the vehicles of which are of the open char-a-cone type. The total capacity of the latter is 120 passengers.

In both of these trains the power is supplied by an 80 horsepower four cylinder internal combustion motor, driving its own vehicle and four followers, each of 5 tons capacity. The change speed gear is provided with eight different ratios enabling the fully loaded train to negotiate hills up to 1 in 5 1-2. The latest improvement embodied in these trains is the use of rim wheels, the two central ones of which are drivers, for each vehicle. This reduces the load per axle, and more important still permits of sharper turnings. In fact the whole train can turn in a radius of 15 feet.

The gasoline consumption has been demonstrated by trial to avearge 2 1-2 miles per gallon.


RENARD ROAD TRAIN BUILT FOR CARRYING PASSENGERS AND FREIGHT IN INDIA

ROAD SYSTEM IN NEW YORK

Under the classification of roads in New York State they are divided into state, county and town roads. The state roads are the main traffic lines connecting the larger centers of population. They comprise 4 per cent. of the total mileage of the state, and are to be constructed and maintained directly by the state, and at state expense. The county roads are those which form within each county a properly developed system of main market roads, taking into account their use for the purposes of common traffic and travel. These roads comprise about 6 per cent. of the total mileage of the State and are constructed under State supervision and at the joint expense of the State, county and town. The town roads comprise the rest of the roads of the State, constituting about 90 per cent. of the total mileage. They are built and maintained under the direction of the local authorities, but with State supervision, the cost being borne jointly by the State and town.

United States Consul Jesse B. Jackson of Aleppo reports the formation of a company to conduct a local freight and passenger service with motor vehicles. Two second-hand machines have been purchased, one a touring car with seating capacity for seven passengers, and the other a motor truck of five tons capacity. He reports that both the roads and climatic conditions are rather unfavorable, but believes that the service will grow and that it affords an opportunity for American builders.

The Commercial Vehicle

Vol. IV July 1909 No. 7

Published Monthly by The Commercial Vehicle, Incorporated, at
1402 Broadway, New York City

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Comveh, New York

Long Distance Telephone
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Subscription Rates

United States, Canada and Mexico . . . . One Year $2.00
Other Countries in Postal Union . . . . One Year $3.00

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Changes in copy or in orders for advertisements for the month following must reach us not later than the 15th of the current month when proof is to be submitted, and not later than the 20th when no proof is required.

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Entered as second-class matter, September 13, 1906, at the post office, New York, N. Y., under the Act of Congress of March 3, 1879.

ABANDONS HORSES, ADOPTS MACHINES

We commend to the sceptical a close reading of the article elsewhere in this issue in which an account of the complete abandonment of horsed vehicles in favor of motor-driven wagons by one of the best known musical instrument houses in the country is published. This decision is worth more as a practical illustration of the possibilities of the motor vehicle than a whole library of argument. There are several points in connection with this service which make the decision one of much importance; to the industry as a notable motor vehicle installation and to the possible user as an unequivocal testimonial to the merits of the machine. The Aeolian company has been one of the most successful users of horses in the metropolis; its animals have been not merely up to the average of quality, but have been of exceptional merit, having taken numerous prizes in competition with the products of other notable commercial stables in New York. In the practical management of its delivery system the company has quite as good a record, and so the change to motor vehicles cannot be laid to poor horsed equipment or inefficiency in the stable or shipping department. It simply indicates a realization by the management of the inadequacy of the horse to meet the requirements of modern business. No animal of any sort, working under any conceivable set of conditions, can put forth the ceaseless effort of the insensate machine. The limitation of the machine is not its capacity to do the work, but rather the endurance of the driver. It is again the "animal" that limits the amount of work done, just as in the case of the horsed vehicle, in which the actual haulage as well as the management of the vehicle is accomplished by animal energy.

It is quite conceivable, however, that a business house might become convinced of the inadequacy of the horse without being in a position to know from practical experience whether or not the motor vehicle was the real solution of its dilemma. The adoption of motor vehicles in such a case might be viewed by the sceptic as a heroic measure of relief, rather than a prudent change of method based on knowledge and belief. In the case of the Aeolian company, however, no such criticism is possible. For several years the company has been "experimenting" with machines of various types and it is important to remember that its experiences were not always pleasant or profitable. The earlier machines put into service, though well representing the then existing state of the art, were very crude constructions viewed from the development of to-day. In common with all other fair-minded and competent investigators the company discovered that however faulty the practice of the vehicle shops may have been, the principle of motor transportation was correct. The scope of the investigations conducted by the company and its breadth of view are illustrated by the character of the installation just decided upon. Both gas motor and electric motor vehicles have been adopted, the work assigned to each group being suited to its respective capacity and limitations. And in the essential matter of maintenance, long experience with the horse has taught the management the importance of having systematic care taken of the machines with adequate facilities. Work has been going forward vigorously in the former horse stable, removing every trace of the malodorous animal and substituting machinery and charging apparatus, which will "stay put" when handled by competent help and will not develop unexpected traits with which the "intelligence" of the horse frequently interrupts the regular course of business.

In further considering this installation of motor vehicles the character of the company's business should be remembered. Practically every sale made calls for delivery by the house. The spectacle of a man buying a piano or organ and carting it away in his own wagon is too infrequent to be a consideration in laying out the delivery system, and the particular requirements in this case do not merely include what may be called "regular" deliveries, made, in fact, at the convenience of the merchant rather than of the customer. It is a common experience with the house that the sale of an instrument depends upon the promptness of delivery. Musical instruments are a very usual form of gift, and the busy business man frequently forgets or puts off a purchase until the last moment. His appreciation of the certainty of motor delivery to even remote points in the metropolitan district will unquestionably compel his patronage of this house as against any other in which horsed vehicle service and delays are the rule.

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SCOPE AND GROWTH OF INDUSTRY

Taking as their text the horse-drawn vehicles of this country, many writers, in discussing the growth and possible magnitude of the commercial motor vehicle industry dwell on the greater numerical value of the pleasure wagon. They do not stop to consider that the tremendous total of wheeled pleasure vehicles annually produced has been made up very largely by the cheap machine-made buggy. But even assuming that all pleasure wheeled vehicles were of a high class, selling at a large margin of profit, the one essential fact remains that the magnitude of the commercial motor vehicle industry is guaranteed not by the addition of motor vehicles to existing equipment, but by the substitution of motor-driven for horse-drawn vehicles in business service. If we stop to consider what this would mean in a single line of business, laundry work for instance, the ultimate size of the commercial vehicle industry can be appreciated. Bearing on this subject, certain figures about horses owned in the United States which have been issued by the Department of Agriculture are informing. The total number of farm horses in this country foots up 19,992,000, and of horses not on farms, 3,008,535, making a grand total of 23,000,532. The estimated price per head is $93.41, which gives the enormous total of $1,171,479,694; and to these figures may be added the 4,056,399 mules owned in this country, valued at $107.76 a head, bringing the total horse and mule value up to $2,585,547,556. In New York State alone the value of the horse stock is placed at $113,000,000. In connection with these figures, the money spent in equipment, feed, etc., has to be considered.

With the increasing application of the motor to vehicles for every sort of work, and even to agricultural implements, the future is full of development almost past computation. From present indications the manufacture and sale of gas motor farm tractors is likely to reach an enormous value at no very distant time. Their capacity for work under any sort of climatic conditions is making a very effective appeal to the agriculturists of the United States. It is certain that a machine capable of plowing, discing, seeding, harrowing, harvesting, threshing, grinding and hauling crops to market is sure to attract the attention of the farmer who finds it so hard to procure labor that manual work is practically out of the question. The possession of a machine makes it possible for the farmer to take advantage of fine weather to hasten certain field operations, harvesting, for example, 60 to 75 acres a day. More thorough cultivation will produce greater crops, and under any sort of favorable conditions the machine will soon pay for itself. Then, too, there are enormous tracts of bottom lands in the Middle West and South which cannot be profitably worked by horses in midsummer, when the heat is intense and the flies a plague. It is certain that the field of the motor work vehicle is not confined to the streets of the city or town.

PUBLIC CABS FOR PRIVATE HIRE

Following the introduction of the public taxicab there has come a demand for vehicles entirely within the control of the hirer; private vehicles in effect. In London, where motor cabs have been in use longer than in any city of this country, the hiring of motor landaulets on a time basis has become an extensive branch of the motor livery business. Our leading article this month gives details of several different services in the British metropolis.

Of course this practice has long obtained in the case of horse-drawn vehicles, that, however, for obvious reasons cannot be effectively used outside the limits of the city in which the stable is located. In the case of the motor landaulet it is possible and usual for the person hiring the vehicle to make long interurban trips, and even tours, when occasion required. Thus the availability of the vehicle has been increased far beyond the limits of usefulness of the horse-drawn carriage. Moreover, it is not the question of convenience alone that will make business for the liveryman, but that peculiar kink in human nature which compels many persons to do things for appearance sake.

Scores of persons would prefer to stand the expense of having a "private" vehicle at their call rather than to hire a cab on the street with meter attached and pay only for the exact mileage traveled. This is "good business" for the liveryman whose occupation is to rent vehicles and not conduct a censorship of public morals. Unquestionably, there are still great possibilities in the development of the public service vehicle.

MOTOR-DRIVEN FIRE APPARATUS

The decoration of a team of discarded fire horses with a placard bearing the inscription, "Stung by an Automobile," by residents of Morristown, New Jersey, a few days ago, was a humorous expression of a cold truth. In no other direction has there been a more rapid growth of expert opinion in favor of the motor vehicle than in that of fire protection. The Morristown incident, devoid of its humorous features, is one that is becoming familiar to residents of hundreds of prosperous cities and towns throughout the country. Speed and certainty are essential in fire apparatus, and while these are recognized as qualities of the motor vehicle quite generally now by the intelligent fire department officials throughout the country, the actual installation of machines is progressing most rapidly in the smaller communities. This is natural, as vested interests do not as seriously hinder progress in the small city or town as in the large city, where the feed bill is large and the grafting official numerous.

In connection with this rapidly increasing use of improved apparatus, the expressions of an expert before a recent State gathering of Minnesota firemen are pertinent. Capt. J. C. Barrett, of Minneapolis, is a close student of his profession and foresees the passing of the horse.

> "The annual fire loss is more than enough to provide the most efficient auto apparatus in every city, village and town in the United States to-day. Hundreds of fires could have been put out with only a nominal loss if they could have been reached five minutes, and sometimes one minute, sooner. The auto apparatus, manifestly, should not be confined to chemical wagons or auto squads carrying small chemicals.
>
> "With the horse-drawn apparatus, you have drivers who are superfluous men. Drivers have to remain with their horses and take care of them, while with the auto every man is available for fighting purposes. But it is in the smaller cities and towns that cannot afford the cost of a steamer that great additional protection will be given—cities ranging from 10,000 down to 500 people. As to economy, suppose a combination chemical and hose wagon, two horses, harness, complete equipment, cost $3,000, which is, I believe, a moderate estimate; it will probably cost 10 per cent of this amount to feed and care for the horses for one year, and say nothing of shoeing and repairs. The depreciation in the horse would amount to quite a sum also, while on the other hand all you would need would be a barrel of gasoline and a half barrel of engine oil. I maintain that twenty miles an hour is ample speed for fire department service, as it is three or four times as fast as the horse will go and keep up that speed for any required distance, and that is as high speed as would be maintained in practice in any of our city fire departments. It should be the policy of fire departments intending to purchase new apparatus to select such pieces as they find most suitable, and buy nothing else. I believe the day will soon arrive when auto apparatus will be used entirely in not only the larger cities, having paid fire departments, but also in smaller volunteer departments."

MOTOR VEHICLE LAWS IN NEW YORK STATE

Veto of Allds-Hamm Bill Delays the Separate Registration of Commercial Vehicles—Penal Amendments Prohibit Unauthorized Use of Vehicles—Important Provisions of Existing Motor Vehicle Law

H. W. SMITH

ALBANY, N. Y.—Motor vehicle reform legislation was killed by Governor Hughes when he vetoed the Allds-Hamm bill at the end of the thirty days immediately following the adjournment of the legislative session of 1909.

While it is true that two bills which affect the owners and users of motor vehicles were passed and signed, there was no amendment to the old motor vehicle law. That law remains the same as when it was enacted as chapter 538, in 1904, so far as any legislation of 1909 is concerned, except that instead of being a general law by itself it is now made a section of the general highway laws under the statutory consolidation acts of the present year. Thus the law as regards registration, payment of fees and the like remains as before.

FEATURES OF THE ALLDS-HAMM BILL.

A number of improvements were embodied in the Allds-Hamm bill which Governor Hughes vetoed, including a distinctive registration for commercial vehicles and a licensing of chauffeurs. But nothing of the kind was allowed to go through. There was no bill passed making the fee for commercial vehicles nominal; nor even introduced as a separate bill for that purpose. All the changes sought to be made which would have made a distinction between the commercial and the pleasure motor vehicle were in the Allds-Hamm proposed new motor law that the Governor vetoed, including the proposed smaller fee for the licensing of chauffeurs of commercial motor vehicles. This was opposed on the ground that it would be unconstitutional to create by separate fees of taxes two classes of chauffeurs. So much for the laws regulating the use of motor vehicles that were not enacted.

There were two laws enacted as amendments to the penal law of the State which will be of interest to the owners of motor trucks and vans equally as well as the owners of pleasure cars. While owners of motor trucks are not much bothered by their chauffeurs taking them out for "joy rides," yet they will be interested in knowing that under chapter 519, laws of 1909, a new section is added to the penal law, as section 1293-a, which provides as follows:

NEW PROVISIONS OF LAW.

Unauthorized use of vehicles.—Any chauffeur or other person who without the consent of the owner shall take, or cause to be taken from a garage, stable, or other building or place an automobile or motor vehicle, and operate or drive or cause the same to be operated or driven for his own profit, use or purpose, steals the same and is guilty of larceny, and shall be punishable accordingly.

This act shall take effect September 1, 1909.

By another amendment to the penal law it is made a misdemeanor for anyone to tamper with or injure or damage any motor vehicle. This new law is subdivision 11-a, of section 1425, of chapter 88, laws of 1909, and makes it "malicious injury," punishable as a misdemeanor, for any person who "with an intent so to do, damages in any manner an automobile or other motor vehicle."

Both these amendments to the laws affecting the owners or users of motor vehicles are penal law provisions and have nothing to do with that section of the highway law known as the "motor vehicle law."

Therefore the motor vehicle law continues to be enforced by the Secretary of State, and its essential details (leaving out references to speed regulations) are as follows:

Filing Statement.—Every person hereafter acquiring a motor vehicle shall, for every vehicle owned by him, file in the office of the Secretary of State a statement of his name and address, with a brief description of the vehicle to be registered, including the name of the maker, factory number, style of vehicle, and motor power, on a blank to be prepared and furnished by such secretary for that purpose; the filing fee shall be $2.

Registration and Record.—The Secretary of State shall thereupon file such statement in his office, register such motor vehicle in a book or index to be kept for that purpose, and assign it a distinctive number.

Registration Seal.—The Secretary of State shall forthwith on such registration, and without other fee, issue and deliver to the owner of such motor vehicle a seal of aluminum or other suitable metal, which shall be circular in form, approximately 2 inches in diameter, and have stamped thereon the words "Registered motor vehicle, No. ——, New York motor vehicle law," with the registration number inserted therein; which seal shall thereafter at all times be conspicuously displayed on the motor vehicle, to which such number has been assigned.

Display of Registration Number.—Every motor vehicle shall also at all times have the number assigned to it by the Secretary of State displayed on the back of such vehicle in such manner as to be plainly visible, the numbers to be in Arabic numerals, black on white ground, each not less than 3 inches in height, and each stroke to be of a width not less than half an inch, and also as a part of such number the initial letters of the State in black on white ground, such letters to be not less than 1 inch in height

Registration by Manufacturerers or Dealers.—A manufacturer of or dealer in motor vehicles shall register one vehicle of each style or type manufactured or dealt in by him and be entitled to as many duplicate registration seals for each type or style so manufactured or dealt in as he may desire on payment of an additional fee of 50 cents for each duplicate seal. If a registration seal and the corresponding number shall thereafter be affixed to and displayed on every vehicle of such type or style as in this section provided while such vehicle is being operated on the public highways, it shall be deemed a sufficient compliance with subdivisions 1, 3, 5 and 8 of this section, until such vehicle shall be sold or let for hire. Nothing in this subdivision shall be construed to apply to a motor vehicle employed by a manufacturer or dealer for private use or for hire.

Fictitious Seal or Number.—No motor vehicle shall be used or operated upon the public highways after 30 days after this act takes effect which shall display thereon a registration seal or number belonging to any other vehicle or a fictitious registration seal or number.

Unregistered Vehicles not to be Operated.—No motor vehicle shall be used or operated upon the public highways after 30 days after this act takes effect unless the owner shall have complied in all respects with this section, except that any person purchasing a motor vehicle from a manufacturer, dealer or other person after this act goes into effect shall be allowed to operate cle shall be used or operated upon the public highways after 30 such motor vehicle upon the public highways for a period of five days after the purchase and delivery thereof, provided that during such period such motor vehicle shall bear the registration number and seal of the previous owner under which it was operated or might have been operated by him.

Filing of Chauffeur's Statement.—Every person hereafter desiring to operate a motor vehicle as a chauffeur shall file in the office of the Secretary of State, on a blank to be supplied by such secretary, a statement which shall include his name and address and the trade name and motive power of the motor vehicle or vehicles he is able to operate; and shall pay a registration fee of $2.

Chauffeur's Registration and Record.—The Secretary of State shall thereupon file such statement in his office, register such chauffeur in a book or index to be kept for that purpose and assign him a number.

Chauffeur's Badge.—The Secretary of State shall forthwith, upon such registration and without other fee, issue and deliver to such chauffeur a badge of aluminum or other suitable metal, which shall be oval in form, and the greater diameter of which shall not be more than 2 inches, and such badge shall have stamped thereon the words: "Registered Chauffeur, No. ——, New York motor vehicle law," with the registration number inserted therein; which badge shall thereafter be worn by such chauffeur pinned upon his clothing in a conspicuous place at all times while he is operating a motor vehicle upon the public highways. If the operator or chauffeur has previously been registered in the office of the Secretary of State, the certificate heretofore issued to him shall be returned to such Secretary, who shall issue to said operator or chauffeur, in lieu thereof, a chauffeur's badge upon the payment of a fee of $1.

Fictitious Badge.—No chauffeur, having registered as hereinabove provided, shall voluntarily permit any other person to wear his badge, nor shall any person while operating a motor vehicle wear any badge belonging to another person, or a fictitious badge.

Unregistered Chauffeur Cannot Operate.—No person shall operate a motor vehicle as a chauffeur upon the public highways after 30 days after this act takes effect, unless such person shall have complied in all respects with the requirements of this section.

MOTOR 'BUS SALE SET ASIDE

The sale of the assets of the Auto Transit Co., of Philadelphia, which operated electric motor omnibuses on Broad street, was set aside in the Court of Common Pleas on June 4 on the petition of creditors. It was maintained that the bid of $14,000 made by Frank Samuel, an iron and steel broker, at the auction sale held by Barnes & Lofland on May 25 was too low. The creditors were unanimous in petitioning the court not to affirm the sale, contending that the purchase price was one-third less than it should have been. The court directed the receivers to advertise for sealed bids, to be opened June 11.

The plant consists of a large garage and power plant at Dauphin and Thirty-first streets which cost $100,000 when erected last year, and a lot of omnibuses and other property, bringing the estimated total cost up to $180,000.

Good roads are discussed in a bulletin recently issued by the A. L. A. M., and their comparative absence from the settled portions of this country is attributed to: Imperfect state laws; inefficient and improper administration and management of roads; ignorance on the part of local road builders of the principles and methods of road construction; ignorance of the qualities essential in road building materials and lack of facilities for ascertaining such qualities; lack of sufficient research and experimental work to devise changes or improvements in road materials or existing methods of construction sufficient to meet modern conditions, reduce cost or increase efficiency.

FRAYER-MILLER TRUCK WITH LIVE LOAD IN NEW YORK ORPHANS' DAY PARADE

TAXICAB ORDINANCE UNSETTLED

The matter of the official regulation of taxicabs and municipal examination of taximeters in New York City is still in an unsettled state. The Board of Aldermen on May 25 passed an ordinance placing in the hands of the Bureau of Licenses the power to inspect and regulate the meters on all cabs used in the city. The measure was known as the Dowling bill, after Alderman Dowling, who introduced it, and was reported by the Committee on Laws and Legislation. The bill provided for the establishment of a new bureau and created positions for fifteen inspectors and one chief inspector. As originally introduced, it also contained several paragraphs fixing the rates to be charged for taxicab service. As passed, however, these were omitted and for that reason Mayor McClellan, after holding a hearing on the bill, vetoed it on June 8 and sent it back to the Board of Aldermen with the recommendation that it be reconsidered and the schedule of rates incorporated in it.

Another hearing of the representatives of the taxicab operating companies was held before the Aldermanic Law Committee on June 15, at which the companies repeated their representations that they could not continue in business under the rates proposed by the original Dowling measure, which fixed the initial charge for the first half mile at 30 cents and the subsequent quarter miles at 10 cents—the rates that prevailed in the city last year.

The bill was then revised and again reported to the Board of Aldermen, who passed it the same day. As passed it fixes the maximum rate for "four-seated taxicoaches" at 40 cents for the first half-mile and 10 cents for each additional quarter mile, with a waiting charge of $1.50 an hour. For "two-seated taxicabs" the rate is 30 cents for the first half mile.

At the time of writing the ordinance had not yet come before the Mayor for his approval.

TAXICAB PRIVILEGES CURTAILED

Under a New York City ordinance passed on May 11, prohibiting public cabs or other vehicles having "special hackstand" licenses from picking up passengers from the curb, a case against Harry McManus, a driver for the New York Taxicab Co., was decided against him on June 3 in the Jefferson Market Police Court by Magistrate Steinert.

The case was prosecuted by the Public Hackmen's Association, which was instrumental in getting the new law enacted as a blow at the taxicab companies and automobile renting concerns.

McManus was arrested on May 14 by Sergeant P. F. Crane, of the traffic squad, at the Panama line pier, to which he had been sent from the cab stand at the Pennsylvania Ferry at the foot of West Twenty-third street, in answer to a telephone call. Upon arriving at the pier a woman stepped up to the cab and, being asked if she had telephoned for a taxicab, replied in the affirmative and entered the vehicle. Thereupon the sergeant asked McManus if he had a public hackstand license and finding that he had not called his attention to the law passed three days previously and placed him under arrest.

The driver was released under a habeas corpus writ secured at once by counsel for the taxicab company. When the case finally came up for disposition, Magistrate Steinert held that "special hackstand" licenses permitted the holder to solicit passengers from the immediate vicinity of the "special hackstand" and that persons holding special hackstand licenses permitting them to stand in front of hotels and ferries had no legal right to take or pick up a passenger in any public street or avenue. He held that as the Panama line pier was not a special hackstand, the taxicab driver was guilty.

The lawyers for the company announced that they would appeal the case to a higher court. Should the law be sustained there, it will affect nearly all the taxicab operating companies in the city, increasing the expense of operation either by preventing cabs which occupy special stands from picking up fares in the street when the cab is returning empty to its stand or making it necessary for the companies to secure both special hackstand and public hackstand licenses.

WASHINGTON TAXICAB RATES

Commissioners of the District of Columbia have agreed upon and announced a new schedule of rates for taxicab service in Washington under the authority given them in the last District appropriation bill to prepare and put into immediate operation, after due investigation, a reasonable scale of charges by cabs, taxicabs and public vehicles for the transportation of passengers in the District of Columbia. After a public hearing and several conferences between the commissioners and officers of the taxicab companies, the following schedule was agreed upon, fixing the maximum rates at practically the same figures as they have been:

CITY SERVICE.

Tariff No. 1. For one or two persons: For the first half mile or fraction thereof, 30 cents; each quarter mile thereafter, 10 cents; each six minutes of waiting, 10 cents.

Tariff No. 2. For three or more persons: For the first third of a mile or fraction thereof, 30 cents; each sixth of a mile thereafter, 10 cents; each six minutes of waiting, 20 cents.

Rate per mile or fraction thereof for cabs traveling empty outside of the two-mile radius hereafter described, 20 cents.

Carrying one trunk, 20 cents.

No charge shall be made for handbags or dress suit cases carried inside the cab, not more than two to each passenger, or for children under seven years of age.

Additional baggage, for each piece, 20 cents.

These tariffs to apply to day and night service.

City service tariffs to apply only to distances of more than a mile. The minimum price for city service for a mile or fraction thereof shall be 50 cents.

No charge shall be made for going or returning to or from any point within two miles of the garage from which the cab is ordered when such distance is traveled without passenger or passengers. Within this radius the meter shall not begin to register until the cab has been entered by its passenger or passengers, except that delay may be charged at tariff rates. The distance traversed by the empty cab outside of the two-mile radius shall be paid for at the prescribed tariff.

UNION STATION SERVICE.

Tariff No. 1 and Tariff No. 2 as for city service.

Cabs going to or from the Union station, or from any garage, to any point within a radius of two miles of such station or garage, shall charge for the distance covered in transit to such point while carrying a passenger or passengers, but shall not impose additional charge for distance covered when traveling empty

The radius of two miles from the Union station extends to Michigan avenue on the north; Fourteenth street and Florida avenue and Dupont Circle on the northwest; Nineteenth street and Pennsylvania avenue on the west; the wharves and the War College on the South; the navy yard and the Pennsylvania avenue bridge on the southeast; Congressional Cemetery on the east, and Mt. Olivet Cemetery on the northeast.

Distances beyond the two-mile limit shall be charged for at the rate prescribed in the tariff. Within the radius of two miles the meter shall not begin to register until the cab has been entered by its passenger or passengers, except that delay may be charged at tariff rates.

THEATER SERVICE.

Taxicab service from any point within two miles of any garage to any theater and return shall be not more than $3 for one or two persons, nor more than $4 for three, four or five persons, and there shall be no other charge, provided that the journey between the point of call and the theater or return shall be made without delay. Any delay en route, while going or returning, shall be charged for at the rate of $1 per hour. Distances beyond the two-mile limit shall be charged for at the rate prescribed in the tariff.

WHITE HOUSE RECEPTION SERVICE.

Night service of taxicabs from any point of call within three miles of any garage to the White House and return shall be subjected to a flat rate of not more than $5 for any number of passengers; and any delay en route, going or returning, shall be charged at the rate of one dollar per hour; and distances beyond the three-mile limit shall be charged at the rate of twenty cents for each mile or fraction thereof, going and returning, for such distance as lies beyond the radius.

HOURLY SIGHT-SEEING RATES.

The maximum rate for taxicab service by the hour, when the cab is used for sightseeing or recreation purposes, shall be $4 per hour.

Penalties.—The penalty for each violation of this schedule of rates shall be a fine of not less than $5 nor more than $25, or imprisonment not exceeding thirty days.

All taxicabs shall publicly display a printed copy of this schedule for the information of the traveling public.

CHATTANOOGA SERVICE STARTED

A motor cab service was started in Chattanooga, Tenn., in June by the recently organized Chattanooga Taxicab Co., which put on four machines as a start and has ordered more. The rates charged are 30 cents for the first half mile and 10 cents for each quarter mile thereafter and 10 cents for each six minutes waiting. The rate for single passengers between hotels and depots is 25 cents. The Mayor and vice-president of the company and two newspaper men rode in the first trip of the first cab. Officers of the company are: J. H. Buchholtz, president; C. C. James, vice-president; Sidney Webb, general manager. Vice-president James is also president of the St. Louis Taxicab Co., now operating twenty-seven cabs, and president of the Memphis Taxicab Co., operating twelve cabs.

FRANKLIN CABS IN PITTSBURG SERVICE

The Pittsburg Taxicab Co., which was organized last April and started its new service in May, has secured twenty Franklin cars of the limousine type for the purpose from the Standard Automobile Co., of Pittsburg. They are finely upholstered in leather and provided with an electric dome light inside, umbrella rack, match and cigar holder, newspaper rack, and speaking tube.

The central station of the new company is located at Center and Negley avenues, and stands have been established at the Schenley and Fort Pitt hotels. A private telephone exchange connects the stands with the station. The schedule of rates is as follows:

First half-mile or fraction	30 cents.
Each quarter-mile thereafter	10 "
Each six minutes' waiting	10 "
Each piece of baggage carried outside	20 "
Fifth passenger riding outside with driver	20 "
First hour or fraction	$5
Each succeeding hour	$4

John W. Weibley is president of the company, and Walter Hammer, of Pittsburg, and Mortin E. Loeb, of New York, who was recently one of the superintendents of a taxicab service there, are in active management of the service and garage.

MINOR TAXICAB NEWS

Fifteen Mitchell taxicabs have been bought through the New York agency for the Mitchell cars by the Broadway Taxicab Co., of which Herman Truell is manager.

Four taxicab drivers were arrested and tried last month in Boston charged with larceny by the Taxi-Service Co., of Boston, which alleged that the chauffeurs manipulated the meters on their cabs so that they did not show the entire distance traveled.

It is announced that a new company known as the Gotham Taxicab Co. will establish a service in New York City, beginning August 1, with an initial lot of fifty new motor cabs and gradually increasing the number as business develops. The cabs are being built to a special design. The proposed tariff of rates is 30 cents for the first half mile and 10 cents for each quarter mile thereafter. Edward J. Dowling is president of the company, John V. Levy, vice-president, and S. L. Root, secretary and treasurer.

The twenty-five new Rockwell cabs that the W. C. P. Taxicab Co. put in service in the streets of New York in June have been very noticeable on account of the striking combination of orange yellow and black paint. They have been much in demand, the calls averaging eighty a day, it is reported. By adopting such a distinctive color combination the company expects to stand or fall by the quality of service it renders. The rates charged are the same as those of other large operating companies in the city, 50 cents as the initial charge and 10 cents for each quarter mile after the first half.

Taxicabs carrying doctors hurrying to patients are required in Memphis, Tenn., to carry Red Cross signs, by decision of City Judge Floyd, before whom the case of a chauffeur for the Memphis Taxicab Co. was brought on a charge of exceeding the speed limit. The defence was that he was carrying a doctor on an urgent case when arrested. A fine of $25 was suspended.

As a result of the strike on the Georgia Railroad recently, the Atlanta Taxicab Co. had many calls for cabs to carry passengers to neighboring towns and cities. The regular meter mileage rates were charged, so that a trip to Covington, 40 miles distant, cost the passenger $16.50 one way and an equal amount for the cab returning empty, or $33 in all. But the company did not make much money on the trips, as the bad roads caused numerous breakages, including a couple of broken axles.

SEATON SPRING WHEEL

Only a few years ago the problem of developing a device in railroad practice which would supersede the old and dangerous link and pin car coupler engaged the attention of hundreds of inventors. Many experienced railroad men were skeptical about the practicability of any automatic device, but after innumerable trials and failures satisfactory appliances were produced and are now in universal use. The same conditions apply in some of the proposed improvements in the motor vehicle field. The spring wheel is one of the problems which has been studied by scores of inventors, as the patent office records show, and there is certainly a large reward in public sale awaiting the development of a thoroughly satisfactory type of spring wheel. Its function is of course to provide a certain amount of resiliency or elasticity, supplementing the regular spring action, where solid rubber tires, wood tires, or metal shod wheels are used.

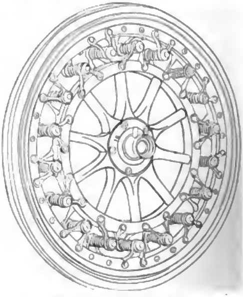
Among the most recent productions in America is the Seaton wheel, shown in the accompanying illustration. This is the invention of B. C. Seaton and is being marketed by the American Spring Wheel Co., Williamson Building, Cleveland, O. A set of the Seaton wheels was fitted to a Cadillac motor truck in 1907 and is still running and giving satisfaction, according to William E. Metzger, former sales agent for the Cadillac company. The truck weighed 3,500 pounds and carried as high as a ton load. The wheels were run more than 6,000 miles by actual record up to March of this year, and during that time no repairs had been necessary except the replacing of three spiral springs which broke, and these were replaced by the driver in half an hour. The breakage did not interfere with the action of the wheel. Another set of Seaton wheels was used for fourteen months on a 2,000-pound Aerocar touring car that was driven 10,600 miles without any tire trouble and without repairs except on spring replacement.

The Seaton spring wheel is believed by the makers to offer a perfectly satisfactory solution of the entire wheel-and-tire problem for taxicabs, delivery wagons, trucks, and all sorts of commercial vehicles, as well as for pleasure cars also. By its use solid rubber tires can be substituted for pneumatics and the wear on the rubber greatly reduced. The wheels can be built to carry any weight.

A new principle is involved in this wheel. All of the springs, which are of helical type, are arranged horizontally instead of radially and are connected at their ends to brackets bolted to the inner and outer parts of the wheel. They are secured alternately at opposite ends to the inner and outer parts, as shown, so that they react against one another. Under load, the hub of the wheel is depressed, causing all of the springs to lengthen slightly, since the inner and outer parts of the wheel remain in the same vertical plane while the springs are forced to assume an angle to the horizontal line that is the shortest distance between their ends. The ends of the springs are secured in case-hardened ball and socket joints that are packed with hard grease sufficient to lubricate them for a year. The pull on the springs is always in direct line of their axes and the load is borne at all times by all equally.

The form of construction described adds greatly to the rigidity of the wheel. The springs being attached to the segments under a tension of 240 pounds each and by reason of their alternate arrangement pulling against each other, the wheel has a lateral strength several times its vertical capacity. Thus: with a capacity of 400 pounds to the wheel, the lateral capacity is 8,550 pounds.

In striking an obstruction the shock is entirely taken up at the first impact. Besides absorbing shocks, the Seaton wheel provides a spring drive that does away with the sudden jolt of starting, stopping and changing speed, which is most desirable with heavily loaded trucks. The wear on tires is also reduced. Continual vibration of the springs prevents dirt and mud from clogging their action. The construction is so simple that anyone can replace any part that might be broken or damaged.



SEATON SPRING WHEEL

DECISION AGAINST OMNIBUSES

Despite the apparent wishes of the general public, it looks as if the recently established motor omnibuses service on a route extending out Riverside drive to Grant's Tomb in New York will have to be permanently abandoned. The solution of the matter probably lies in the adoption of a type of single-deck observation wagon by the company.

The Appellate Division of the Supreme Court of New York State held on June 19 that the city park ordinance adopted last January prohibiting vehicles more than 10 feet in height from using the park driveways or crossing park bridges was valid. The decision was rendered in the case of the driver of one of the double-deck omnibuses operated by the Fifth Avenue Coach Co., an auxiliary of the New York Transportation Co., who was convicted in the Court of Special Sessions of operating one of the 'buses, measuring 11 feet in height, over one of the bridges in Riverside Drive. The case was appealed by the company to the Appellate Court.

It is estimated that the public highways in the following named states total up as follows: Minnesota, 80,000 miles; Wisconsin, 60,000 miles; Michigan, 60,000 miles; Iowa, 70,000 miles; Kansas, 70,000 miles; Nebraska, 50,000 miles; Missouri, 80,000 miles; Illinois, 80,000 miles; Indiana, 70,000 miles; Ohio, 80,000 miles.

APPEARANCES SOMETIMES DECEPTIVE

A vehicle drawn by horses and apparently overloaded always excites the sympathy or indignation of the man on the street, but in the case of a motor-driven vehicle the sight is more likely to call out an expression of admiration for the capacity of the machine and, perhaps, some commonplace about the progress of invention. This thought is suggested by the accompanying photograph showing a Packard 3-ton truck with what, at first sight, appears to be a great overload. As a matter of fact while the cubic contents of the truck body are exceeded by the bulk of the load, its weight is well within the carrying capacity of the machine, for the boxes are empty; the product of a packing case plant operated by T. G. Patterson on Twelfth avenue, New York. To secure additional loading space the truck is fitted with a hinged roof over the driver's seat, which is supported by brackets on the two forward stakes of the truck. It will be noted that the latter is fitted with steel wheels.

RECORD LOAD ON A PACKARD TRUCK

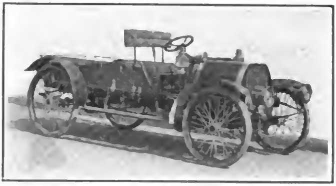
DUSTLESS, WATERPROOF ROADS

The best-known material for the construction of waterproof, dustless roads, according to Douglass McKenzie, an English engineer, consists of blast furnace slag, broken while hot, and immediately immersed in hot tar. The tar oils penetrate right through the pieces of broken slag and greatly modify its nature, so that under the steam roller it consolidates into a homogeneous waterproof covering. Very contradictory results have been recorded from the use of tarred slag, and investigation has shown that much blast furnace slag is overlimed, and when made into a road surface the free lime slakes and the coating breaks up. The slag resulting from the preparation of forge pig iron is not overlimed in this manner, and should be the only slag used for the purpose. There is a strong feeling that slag is too soft a material to long withstand heavy traffic, such as traction engines and heavy motor wagons, and its length of life under the conditions prevailing on many of the main roads of this country is still a doubtful quantity. Probably its use will show an economy in some districts, but not in others.

Some firms are also introducing waterproof road materials prepared from limestone treated in some way with tar. Limestone is an absorbent material, and the tar adheres to it very readily. The resulting road surface is very good, but again, the material is of a somewhat soft nature, and its life under heavy traffic remains to be proved. The application of tar, whether in a raw state or treated by distillation, to form a waterproof granite road, has not been very successful. From the many examples of tar painting that I have studied I have come to the conclusion that the great mistake has been in the use of tar as it is usually sold. Much better results have been found when the tar has been distilled, as the process is usually termed—that is to say, when the ammoniacal liquors and other volatile parts have been distilled out. But this process of distillation is not sufficient, as the tar is still capable of considerable further alteration after application. In many cases, all that has remained after use in the tar paving has been a brittle substance of the nature of pitch, which fractures under the impact of steel tires, and the paving breaks up. What is required is the addition of some material that will toughen the tar, in much the same way that pitch is toughened for insulating purposes. A paving prepared with such a toughened tar should always remain sufficiently elastic to prevent fracture under the impact of steel tires; and at the same time sufficiently rigid to resist the drawing force of a traction engine driving-wheel when it is used to impart motion to a string of loaded wagons.

LIGHT, AIR-COOLED DELIVERY WAGON

A light delivery wagon, shown in the accompanying engraving, has been placed on the market by the Wayne Kratzer Automobile Company, of Allentown, Pa., to meet the demand for a moderate priced vehicle which can make rapid package deliveries. The machine here shown is fitted with a 12 horsepower double-opposed air-cooled motor. A noticeable feature of the construction is the steel wire wheels which are very durable and which are not influenced by atmospheric conditions. The machine has three forward speeds and center chain drive to the rear live axle. The oiling system has been very carefully worked out. The company will manufacture three models for varying loads and will equip the machines with either two- or four-cylinder motors. The wagon shown has open box body and lazy back to driver's seat.



NEW MOTOR WAGON BUILT IN ALLENTOWN

OF INTEREST TO VEHICLE BUILDER AND BUYER

The "Technical Index," a systematic record of current technical literature, is published monthly in the United States by the George H. Gibson Company, Tribune Building, New York. This Index comprises a systematic descriptive record of articles of general interest appearing in about 200 engineering and technical journals, reviews and proceedings of technical institutes of all countries. The engineer or technician who desires to keep in constant touch with the progress of any special subject in which he is interested can find no more reliable or expeditious means than the regular consultation of its pages.

An interesting statement concerning the life of a friction-driven motor car has been issued by the Cartercar Company of Pontiac, Michigan, respecting the twentieth car shipped from its plant. It was first sent to Chicago and driven about 800 miles through sticky Illinois mud, and subsequently placed in demonstrating service. In the years 1906 and 1907 it was entered in the reliability runs of the Chicago club and secured perfect scores. After it had been driven in all 23,000 miles it was sold to Mr. H. B. Walker of Chicago, who has since driven the machine 4,000 miles, and he now is so well satisfied with it that he would not sell it for almost the price of a new model.

A new price list of Hess Bright ball bearings has just been issued from the headquarters of the manufacturers, Twenty-first Street and Fairmount Avenue, Philadelphia, Pa. This takes the place of all previous lists. On a number of sizes substantial reductions in price have been made.

J. Frank Waters is president and general manager of the newly-organized Fidelity Motor Car Co., with offices in the Edgcomb Building, Chicago. The company will build commercial motor vehicles of 1 ton capacity. Mr. Waters was formerly general manager of the Monitor Automobile Works.

The motor vehicle show at Atlanta, Georgia, under the auspices of the National Association of Automobile Manufacturers, will be held in the Auditorium-Armory, in that city, November 6 to 13 next.

The Seagrave Company of Columbus, which is one of the pioneers in the manufacture of motor fire equipment, has recently received several orders for trucks and hook and ladder wagons from Eastern cities. Not a long time ago a test was made at the plant of the company, located south of the corporation limits, at which time a number of fire chiefs were present. Improvements on the equipment are constantly being made, and the output of the concern is attracting attention from every section.

The recent addition to the plant of the Rapid Motor Vehicle Company, of Pontiac, Michigan, has been found insufficient to meet the requirements of the constantly increasing business of the company. It has been decided therefore to build another addition, which will be two stories high, 640 feet long and 60 feet wide. This new building will be constructed of reinforced concrete, with unusually large window space.

The Decennial International Automobile Show in New York, under the management of the American Motor Car Manufacturers' Association, together with the Importers' Automobile Salon and the Motor and Accessory Manufacturers, will be held in the Grand Central Palace, December 31 to January 7 next. Mr. Alfred Reeves, the general manager, has offices at 505 Fifth Avenue, New York City.

Mr. Edward P. Chalfant has resigned as manager of the Association of Licensed Automobile Manufacturers to join the forces of the Packard Motor Car Company, of Detroit. This is the second time within a short period that a manager of the A. L. A. M. has retired from that association to become associated with the Packard company. About a year ago that organization was reinforced by Mr. M. J. Budlong, then manager of the A. L. A. M., previously president of the Electric Vehicle Company, and who is now president of the Packard Motor Car Company of New York, the metropolitan Packard selling company. Mr. Chalfant will be located at the factory in Detroit, where he will assist General Manager S. D. Waldon and President H. B. Joy in the executive work of the company.

An interesting catalogue has been issued by the Carter Car Company, of Pontiac, Mich., describing among its other products the Carter car delivery wagons with both closed and open bodies. Intending purchasers of such vehicles, or other interested persons, can procure copies of the catalogue on application to the company.

Applications for agencies are being received by the Abendroth & Root Mfg. Co., builders of the Frontenac motor truck. This widely known engineering concern has been in business for more than forty years, and has an international reputation for quality of work and responsibility. New show and salesrooms have been established at 1621 Broadway, New York, and the trade is invited to call there and inspect the 3- and 5-ton gasoline trucks.

"Ten Years in Ascendency" is the title of a very complete catalogue just issued by the Diamond Rubber Company, of Akron, Ohio, which contains very complete information about tires of all classes and their adjustment and care. It will be found a very useful reference book by tire users.

The Custead Motor Vehicle Company, 89 Water St., New York, has been incorporated to place on the market trucks and delivery wagons driven by gas motors and equipped with a special form of transmission, the invention of Mr. W. D. Custead. A limited amount of stock is being offered at public sale, the capital of the company being $100,000.

An attractive circular sent out by the Packard Motor Car Co. shows the widespread distribution of the Packard trucks. Reproductions of photographs illustrate Packard trucks in service on the wharves at San Francisco and in front of the coastwise steamship docks in New York.

The Hyatt Roller Bearing Company, of Newark, N. J., has moved its general sales offices to Detroit, occupying quarters in the Trussed Concrete Building. The removal was occasioned by the extensive development of the business with automobile building concerns, a very large percentage of those in America being located in Detroit.

A well designed booklet has been issued by the Jones Taximeter Company, from its offices at Broadway and Sixty-seventh Street, New York, describing the Jones taximeter. A large number of these instruments has been turned out, and they are in use in cities from Boston to Los Angeles. All persons who are in any way interested in the operation of taxicab companies will find this pamphlet of interest. Copies may be had on application to the manufacturer.

The Remy Electric Company of Anderson, Indiana, has received a contract from the Buick Motor Company for 30,000 high-tension Remy magnetos for the season of 1910 on minimum specified delivery. The Remy company has been obliged to greatly extend the capacity of its plant owing to the increasing number of orders received, and when this is completed it will have a capacity of 1,000 high-tension magnetos a day.

A special push switch for use on electric trucks to operate the electric gong has been placed on the market by The Churcher Electric & Mfg. Co. of Cincinnati, Ohio. This button switch is large and substantially made. It is not likely to get out of order even when subjected to rough use on the footboard of a truck, and it will not shock when wet.

A socket wrench sold in the form of a set for hexagon sizes, from 5-16 inch to 1 9-32 inch, is being marketed by the Frank Mossberg Company, of Attleboro, Mass.

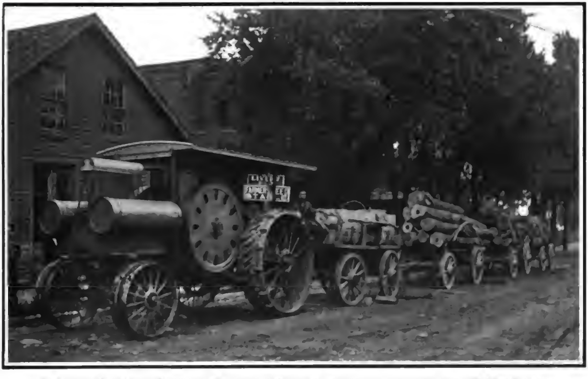
The Commercial Vehicle

Vol. IV August 1909 No. 8

GAS MOTOR TRACTORS FOR AGRICULTURAL WORK

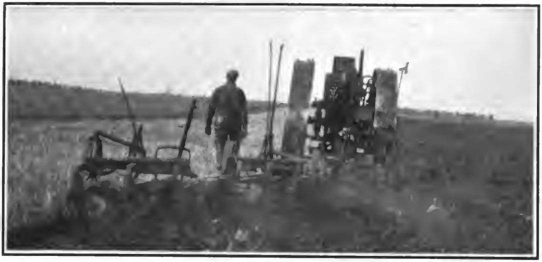
Consideration of the Field as a Market for Commercial Vehicle Builders—Types of Machines Now on Sale in the United States and Abroad—Desirable Features of Construction

HENRI GODEFROY



GAS MOTOR TRACTOR BUILT BY OHIO TRACTOR MFG. CO. HAULING ON STEEP GRADE

IN a previous issue we enumerated a number of special applications to which the explosion motor and many truck component parts had been or could be put, and which were considered as offering very tempting opportunities as side lines, giving flexibility to the principal output, and generally affording very good profits. Among these were mentioned the development of the gasoline or kerosene engine driven agricultural tractor. The possibilities in this line and the results already obtained, which are probably not as generally appreciated as they rightly should be, have suggested the following study of the question, with the object of giving the reader a broad view of the situation and supplying those more directly interested in it with a basis on which to build



TRANSIT THRESHER CO.'S GAS MOTOR TRACTOR AT WORK PLOWING

up, by personal consideration of the problem, an opinion concerning the outlook and a plan of campaign if entry in the field is considered.

The agricultural motor problem is a universal one and has received attention the world over. The old countries of Europe look to it as a possible help in the solution of the economical questions arisen from the exodus of the laborer from the fields to the manufacturing centers. The newer countries, including the remotest colonies of Africa and Oceanica, expect to find in it the help that will replace economically the inefficient native labor. The principal market, however, is within the borders of our own country in the large agricultural areas of the West and in the tremendous grain growing territory of the Canadian Northwest. The progressive attitude of those who are doing the pioneer work in the latter region was displayed by the holding of the recent tractor trials in Winnipeg, the first of the kind on this continent.

The great strength of those who, seeing the opportunity, will avail themselves of it, will reside in the fact that they will be addressing themselves to the branch of human activity which is the very basis of all others and is that of greatest stability, as was evidenced in the still lingering financial depression—agriculture. The magnitude of the market having thus been outlined, what has so far been done in the different industrial countries to create and supply the first demand will now be considered.

CONDITIONS IN AMERICA

In this country there are at present several concerns engaged in the production of agricultural tractors as their regular line. They are all doing very good business, and the field is so wide and its requirements so varied that probably less than in any other line do they feel the effects of competition.

The American concerns at present manufacturing machines of the type considered here can broadly be divided into three classes, which will be considered in order and the example of a typical concern in each class cited, together with a brief consideration of mechanical characteristics of its product.

Concerns having their origin in the demand for agricultural machinery, pure and simple. In the concerns so formed one can reasonably expect to find the greatest amount of knowledge concerning the requirements of the work to be performed by the field machines, and evidence of it will be found in their product, provided that they have had sufficient actual practical experience with it to find out the possible mechanical shortcomings of the first machines built. This is the case with the Transit Thresher Company of Minneapolis, Minn., which we shall select as an example of this class, and they themselves frankly admit it when referring to the difficulties the constructor of their machine had to labor under when he first put it to actual work.

Their machine, which is illustrated pulling a gang of twelve plows with only one man to operate both engine and plows, presents some unique and noteworthy characteristics, beyond this evident and most notable one of requiring the minimum possible amount of skilled attendance. An inspection of the illustration will at once show the very large proportions of the 8-foot high driving wheels, which are claimed not to sink more than a half inch in the softest ground, thus considerably reducing the resistance to motion and proportionately reducing the fuel consumption. From the very inception of the machine a vertical four-cylinder engine was used. This engine, of 35 nominal horsepower, is of sufficient dimensions to vouch for the validity of its maker's claim as to its actually developing 70 horsepower. It drives, through a simple clutch, a train of speed reducing gears, which in turn drive a cross shaft. From this shaft the power is applied to the wheels through pinions working on spur main driving gears, 6 feet in diameter, anchored to the wheel rims, thus taking all strains from the hubs and spokes proper. The wheels themselves are made up of 3-4-inch wire spokes, the rim being 18-inch face and built up of curved steel plates, reinforced by 2-inch internal angle iron flanges. Pegs can be screwed into the wheel faces to increase the grip on the ground.

ROLLER BEARINGS USED

Roller bearings are used throughout, even to the crankshaft bearings, and naturally increase the general mechanical efficiency of the tractor, being one of the many proofs of the care with which the details have been thought out to reduce fuel consumption. The latter has been one of the main aims of the makers, who are fully aware of the fact that their machine often would be called upon to work in remote sections where transportation charge on fuel would be unduly heavy. In this respect they also claim satisfactory running on kerosene.

A 100-gallon tank of water is carried at the front of the channel steel frame for engine cooling purposes, this tank being built up on the tubular boiler principle to increase its cooling surface. A gear pump is used to assist the circulation of water. A reverse is provided for backward motion.

From this description it will be seen that whether voluntarily or not the makers of this tractor have quite closely approximated what might be termed "current automobile practice," having done so, in fact, more than any of the other concerns which we shall review here. There is one point, however, where remarkable originality is shown. It is in the application of an automatic steering arrangement, through which the tractor, when working in the fields, automatically follows the direction given by the first furrow from which it is started without necessitating the driver's attention. The apparatus works as follows: The front part of the tractor (which is comparatively light) rests upon the front axle by means of a fifth wheel arrangement. About 12 feet in front of the latter, and connected to it by means of a suitable parallelogram of steel rods, is what might be termed a pilot wheel of small diameter, so that it will not have any tendency to roll out of the guiding furrow. This wheel is held at the outer forward right-hand corner of the parallelogram in a manner very much similar to that of the steering wheel of a tricycle, and is so connected with the fifth wheel of the front axle that the latter is automatically set at the proper angle when the pilot wheel has its course altered through the deflections and curves in the guiding furrow. Above the pilot wheel stands a high vertical pole carrying at its top a horizontal arrow, plainly seen in the engraving, and which at all times indicates to the man in charge the direction that the machine follows, and thus allows of his making any rectifications in the direction which he may judge necessary. To make the operation of this steering apparatus possible, it is necessary to at first strike what we have termed as the guiding furrow in the ground. In ordinary running this furrow is the last of those which the machine has struck in its preceding passage. It is claimed that with this arrangement if a furrow is struck around a field the machine will follow it by itself even around quite abrupt corners, provided that the guiding furrow is but slightly rounded there so as to always provide a path in which the pilot wheel will not bind. Thus all the work required from the operator is to turn his plows at the end of the field and place his pilot in the proper furrow for guiding.

THE HITCHING APPARATUS

Another interesting detail in this machine resides in the hitching apparatus. The latter is so arranged that when plowing the plows will be drawn squarely, avoiding their crowding into each other's way. This apparatus will also permit of hauling farm machinery which the tractor may be driving without breaking the power transmitting connections between the two machines. For instance, if threshing has to be done at different points on the farm the thresher can be taken to the different locations where work has to be performed, and yet be pulled so squarely that no lining up will be necessary on point of arrival. The belt does not even need to be removed. This saves considerable time, as work can be started at once upon arrival without the usual necessary preparations.

We now come to another class of tractor builders, which includes concerns that had previously built internal combustion engines for stationary work. The Kinnard-Haines Company of Minneapolis, is typical of this class. Its first product was the stationary gasoline engine, for which a large demand existed for grain elevators, feed mills, creameries and small manufacturing or isolated plants in general. Later, this company took up the construction of portable engines, merely consisting of a stationary plant on a suitable truck admitting of easy hauling to the particular spot required, and this found a large market on farms for the driving of the numerous machines created by progress in farming methods. From the portable machine to the self-moving tractor there was but a short step, and it was soon taken, so that a line of "flour city" traction engines was eventually added by the concern, gradually growing from the single cylinder 8-horsepower 2-ton machine, to the most elaborate four-cylinder 30-horsepower 3-ton plowing engine.

ENGINE BASE NOT USED

One of the main characteristics of the Kinnard-Haines engines, except the four-cylinder type, in which the motor is upright, resides in the fact that no engine base proper is provided for; the horizontal cylinders as well as the crankshaft bearings being bolted direct to the channel steel frame sides, which thus form the actual engine base. In all but the four-cylinder machine the jackshaft is connected to the engine through a chain drive, while the drive to the wheels proper is similar and presents the same features as in the transit thresher machine previously described.

In the one and two-cylinder machines the rims of the driving wheels are cast iron with cleats formed of integrally cast cross bars; the spokes are made up of wrought iron flat stock. The steering is through a hand wheel operating traction chains attached at both ends of the centrally pivoted front axle.

No special radiating arrangement, but a very large water tank is used in connection with the engine cooling. In the four-cylinder tractor the engine approaches the usual automobile, or rather the marine type; in the others it is strictly a modified stationary engine with the working parts directly exposed. In all cases jack pulleys are provided for for the driving of stationary machinery.

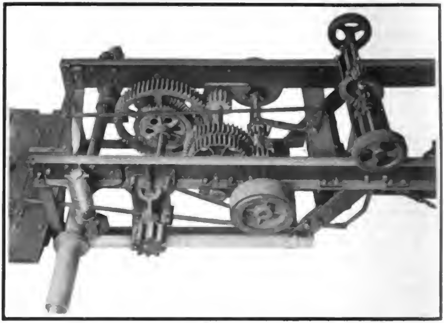
Concerns specializing in the construction of gasoline tractors include the Hart-Parr Company of Charles City, Iowa. This company had an extensive experience in the construction of steam traction engines, and they also formerly built stationary and portable gasoline engine power plants. In the construction of the Hart-Parr tractors two-cylinder horizontal engines are used exclusively; the cylinders being set side by side with the rods connected to a two-throw shaft with crankpins at 180 degrees setting. The valves work in vertical cages at the rear of the combustion chambers, the working parts are all enclosed in dust-proof oil cases, and an exhaust port at the bottom of the stroke is provided to relieve the main exhaust valve.

WHEELS DRIVEN FROM HUBS

The wheels are driven from the hubs, through the spokes, a spur gear differential is provided. One peculiarity of the machine resides in the cleat on the rims, which, instead of consisting of screwed on pegs or cross bars, is formed of a strip of heavy gauged undulated sheet steel encircling the rim proper with its corrugations running at 45 degrees angle from the axis of the wheel and in opposed directions in the two wheels, so as to avoid any tendency towards the production of transverse motion. The wheels are entirely built up of sheet steel and round section wire spokes.

The machines are made in two sizes: 17 and 22 nominal horsepower, delivering easily twice this rated output in normal running. Oil cooling is entirely resorted to, through a centrifugal pump and a radiator. Kerosene is stated to be the normal fuel, a special device being provided for starting on gasoline. The heavier distillates, known as California engine distillates, can also be successfully used. It is claimed that for the same class of work the Hart-Parr tractor will operate at two-thirds of the cost of a steam engine.

Another gas motor tractor which contains some very ingenious features of design is built by the Ohio Tractor Manufacturing Company, of Delaware, Ohio, under the Harrold patents. This tractor weighs 18,000 pounds, is fitted with a 45-horsepower gas motor and its suitable for all kinds of haulage, such as the cultivation of farm lands, road making, or transportation on the highways hauling trailers. The accompanying reproduction of a photograph shows the tractor hauling four trailers up an 8 per cent. grade.



TRANSMISSION AND STEERING GEAR OF OHIO TRACTOR
(Built under Harrold patents.)

In the Harrold machine the engine and transmission mechanism is carried on a heavy frame of channel steel, at the forward end of which cylindrical tanks are located on the sides, abreast of the cooling apparatus, for water or fuel. The motor has twin cylinders 9 3-4 inches by 16 inches, and a crankshaft 3 3-4 inches in diameter. Two heavy flywheels are fitted, of the web type with oval radial slots. Each flywheel has a large hub or boss and a heavy rim, so that there is an annular space between the boss and the rim, on the inside of the wheel. In these spaces are housed wide-faced friction pulleys, carried on the outboard ends of the first motion shaft of the power transmission system. This shaft is mounted in tilting bearings so that the driver can readily bring the friction pulleys into contact either with the rim or the hub of the flywheels, giving motion to the tractor forward or backward as need be. From the first motion shaft, power is transmitted to the driving pinions (which mesh in the circular racks of the road wheels) through suitable reduction gearing in which a bevel gear differential is interposed. The usual construction provides two speeds in either direction, 1 1-2 and 2 1-2 miles an hour. A third speed of 4 miles an hour for road haulage, exclusively, can be added if desired.

A very simple and effective power steering gear is used in this tractor. Its construction and also that of the driving mechanism will be quite intelligible upon inspection of the accompanying illustration of the gearing. A cross shaft, composed of two spindles carrying bevel gears on the inboard ends and friction pulleys on the outboard ends, is located so that these pulleys can contact with the rims of the flywheels—in the annular space already referred to. The bevel gears on the spindles mesh in opposite sides of a bevel attached to the upper end of a vertical shaft, the horizontal cross shaft swiveling about the vertical shaft as a center. The lower end of the vertical shaft is geared to a drum, on which the usual chains, connecting with the front axle, are wound or unwound to steer the tractor. Having in mind the layout of the steering mechanism, it is obvious that when either friction pulley is brought into contact with the flywheel on its own side of the tractor the steering gear will operate in one direction, and when contact is made on the opposite side the drum motion will be in the reverse direction. An easy movement of a lever on the operator's platform controls this power steering gear.

In addition to the two cylindrical tanks on the front of the frame, previously referred to, there are two tanks in the rear of the tractor, giving a total tank capacity of 260 gallons. The rear tanks are usually filled with gasoline, giving a fuel supply of 80 gallons.

The cooling apparatus, located in front, includes a water tank of 80 gallons capacity which is connected with a closed condenser by a pipe perforated with a large number of small holes. Through these holes the jacket water descends in a fine spray, meeting a current of air induced by a small fan driven by the motor. If used in a locality where intense cold was usual in winter, the cooling system could be filled with oil.

As will be noticed from the illustration of the complete tractor, it is equipped with a shade top through which the exhaust pipes are carried, with suitable mufflers. The driving wheels are 64 inches in diameter, and made with faces up to 24 inches wide; with this width face the extreme breadth of the machine is 9 feet.

From the foregoing it will be seen that we find ourselves in the presence of an already well-established American industry, although probably ignored by a large number of people. It seems that American makers of tractors have confined themselves so far mostly to the very large market offered by American agriculture. The conditions of land ownership in Europe are quite different, as well as the farming methods, and in the following part of this study, which will concern the English and French makers, we shall find machines more especially intended for use in the colonies.

(To be continued)

PACKAGE DELIVERY IN KANSAS CITY

A fleet of fifteen Reading-Standard motor cycles is maintained in constant service by the Burgher Package Delivery Company, of Kansas City, to supplement the forty-five horse drawn package wagons which it operates. The motor cycles cover on an average from 75 to 100 miles a day, enabling very prompt deliveries of packages to be made at any hour regardless of the regular routes followed by the wagons. The service was started with four machines about a year ago and now the company is figuring on adding five machines to the fleet, shown in the accompanying photograph. All repairs are executed by the company on its own premises. Its service included deliveries in suburban towns as distant as 20 miles from the city, giving all customers at least one delivery a day at the most distant points.

The charges for motor cycle delivery are based on distance and also weight of package. They run about double the cost of package delivery by horsed vehicle. As the warehouse of the company is located in the business section of Kansas City, all packages are easily collected by its employes and are routed from its building.

FLEET OF R-S MOTOR CYCLES IN BURGER PACKAGE DELIVERY SERVICE, KANSAS CITY

THE PRINCIPAL CAUSE OF VALVE NOISE in a gas motor is allowing the valve to slap on its seat. The descent of the valve should be suddenly arrested just before it strikes its seat, either by a slight rise in the cam or by a very gradual taper. The valve spring should be of sufficient strength to keep the roller in contact with the cam. One American experimenter says that in proper design the sound produced by the seating of the valve cannot be heard outside the motor with the manifolds, carbureter and muffler connected. The weight of valve necessary to give the best result is a matter for mature consideration. The thickness of wall and shape of the manifold are also important.

LOCATION OF MOTOR CYLINDERS

It has been said that inasmuch as a gasoline motor crankshaft revolves in only one direction it is mere common sense to place the cylinders in such a position that the pistons will transmit the power impulses to the crankshaft most effectively; that is, offset so that the maximum force of explosion is delivered on the piston when the crank is past the top vertical center line, and therefore in the best position to receive it, and the pressure on the cylinder wall during fifteen to thirty degrees of the firing stroke is, owing to the reduction of side-thrust, diminished. While this statement may be true, it is apt to be misleading, and in any event is not the only consideration. There are very positive advocates both for and against offset cylinders. Among the advantages claimed for offsetting are: Shorter connecting-rods, reduced wear, lighter construction, reduced friction between the pistons and cylinders on the power stroke, more direct turning effect on the crankshaft, less likelihood of a knocking motor, less shock on the engine bearings, less overall motor height necessary, greater motor flexibility and appreciable increase in power.

On the other hand, it is said by those who prefer the construction wherein the cylinders are placed medially opposite the crankshaft that the claimed advantages of reduced side-thrust on the power stroke and more direct turning effect on the crankshaft have not much more than a theoretical value; that in T-head motors with their two camshafts offset cylinders involve complication desirable to avoid. And per contra statement above, that knocks are more common and wear is greater than in the usual type of engine. Further, it is said that the offset becomes less advantageous at high engine speeds. Perhaps the most commonly advanced argument against offset cylinders is that the engine is thrown out of balance.

The controversy comes down to these two general positions, namely, on the one hand that in properly proportioned design it is unnecessary to offset cylinders in order to take care of the alleged counterbalancing advantage of doing so, less side-thrust on cylinder walls on the power stroke, etc.; and on the other hand that if an engine with offset cylinders is made as it should be, certain distinct advantages which have been suggested above are gained and clearly counterbalance any consequent disadvantage there may be.—Coker Clarkson.

ON THE SUBJECT OF COMMERCIAL VEHICLE BODIES

A Practical Discussion of the Causes Which Determine the Type of Body Fitted to Machines for Carrying Freight or Passengers in Road Transportation

MORRIS A. HALL

COMMERCIAL car bodies may be divided into two main classes, viz.: passenger and freight, each of which in turn may be divided into three main subdivisions; the open, the closed, and a combination of the two. Truck bodies again divide, regardless of form, into wood and metal, the necessity for one or the other being not one of cost, convenience or whim, but enforced by the nature of the load or service.

Each manufacturer has his own method of working out vehicle bodies, particularly motor truck bodies, in which even the same style of body in the same class and subdivision is fashioned out differently in different shops.

Of course, the price, the ultimate selling price, influences the body, first, of itself and, second, indirectly by influencing the type and location of the power plant wheel base and other items which in turn influence the body.

The principal influencing condition, however, is the use to which the body will be put, or more correctly the use for which it is intended. As of course a body intended for one use, say carrying dry goods, would not always be suitable for another widely different class of work, such as handling coal.

Under this head would also come the division into two classes of goods to be handled, one perishable or liable to damage from air, wind, water, heat or cold, and, second, imperishable or unaffected by the elements.

Thus in the former class we have meat, which must not only not be exposed to the elements but must be refrigerated or cooled in addition. Similarly fruit, while it may be exposed to the air, would be enclosed preferably, and for long trips should also be refrigerated. So, too, with ice and kindred products like milk, cream, ice cream or baked goods.

Then on the other hand there are perishable articles which must be enclosed and heated rather than cooled, such as plants, flowers, and that class of goods handled by florists. Thus a radically different closed construction is required from those to be cooled.

Also perishable goods which are of a high value, as raw silks and the silk mill products, including broad silks, ribbons, etc., must not only be covered carefully against weather conditions, but must be carefully constructed and well guarded also, so that a combination of wood and metal that is nearly thief-proof is necessary. This naturally introduces other elements, thus calling for a differently constructed body. To cite a case in point the writer is familiar with a truck service, between Paterson, N. J., and New York City, several of the trucks being restricted to the hauling of silk. Although nominally 3-ton trucks, the value of a load of silk runs from $30,000 to $50,000, being more often at the latter figure. It can readily be seen that a daily load of this value requires some protection other than the ordinary closed body offers.

Again, any product which is in itself imperishable and dirty, hard to handle or subject to rough usage, would naturally require a stronger and more rugged body, else

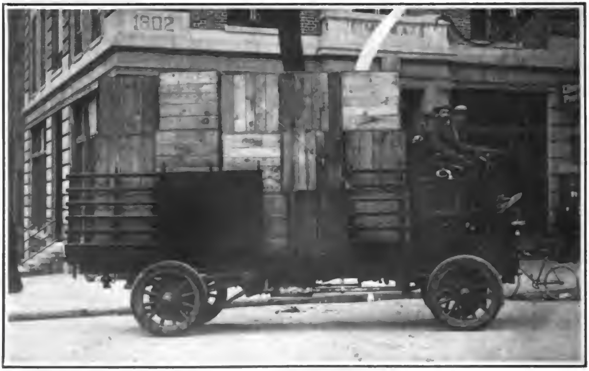


FIG. 1—TRUCK WITH 3-TON BODY FOR CARRYING TOBACCO CASES

the deterioration of the body would be out of all proportion to the chassis. As for instance coal, coke, broken stone, gravel, sand, asphalt, ashes, garbage, and similar substances would call for a metal body to which sheet steel lends itself readily.

Here it must be borne in mind that the distinction is a matter of rough usage and not weight. For instance, cut stone fully as heavy per load as any of the other substances mentioned, but subject to careful handling, is always transported in wooden bodies. Under the head of metal bodies, although somewhat different, come the various tank wagons for oil, water, tar, gasoline and other liquids.

Then there are such users of trucks as storage and carting companies, express and transfer concerns, whose business requires partial but not complete weather protection and large loading space. This latter in turn influences the construction, for the larger the body the heavier it will be in proportion to the total weight of the vehicle. This is undesirable, so the ratio is kept as low as possible by building a skeleton or light stake body with a fixed top and, perhaps, waterproof roll curtains for the sides, thus securing the necessary partial protection with light weight and large loading space.

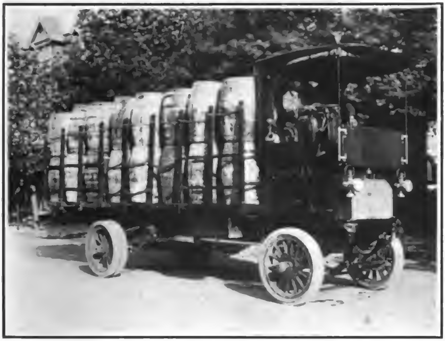


FIG. 2—STAKE BODY FOR CARRYING BARRELS

There is another class of material which would not rank as perishable, but does not class with the rough materials previously mentioned, and therefore would not require a metal body with its additional weight, strength and expense. Under this heading would come trucks built without tops or curtains to carry beer, ale or porter, bottled or barreled, metal goods, loose or boxed, or any other boxed or crated materials like tobacco, shoes, dry goods and the like, hardware such as kegs of nails and rivets, all classes of lumber and mill work, bagged materials, bundles of rags and the like. Fig. 1 shows a 3-ton truck loaded with tobacco, which illustrates one of the styles of body referred to.

An additional classification is made necessary by barrels, other than those mentioned, such as oil in barrels,

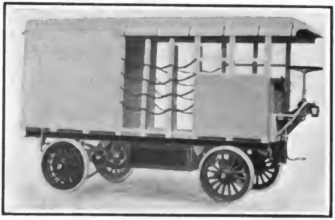


FIG. 3—BODY DESIGN FOR FLOUR BARRELS

no cover or protection being necessary. As ordinarily worked out these trucks have the simplest possible form of platform with stakes and chains to retain the barrels. The writer recalls a barrel truck built for an Eastern oil company; this had space for twenty-four barrels, three across by eight deep, the stakes at the sides coming between the barrels so that an overhang of about 9 inches on each was allowed. As the barrels measured 30 inches in diameter at the bung this made the platform 72 inches, or 6 feet wide. The overhang at the rear was much greater than this, making the platform length in excess of 18 feet. The barrels when empty weigh from 75 to 80 pounds, so that a load of forty-eight empties meant 3,600 to 3,840 pounds, or nearly 2 tons. The full barrels on the other hand tip the scales at from 500 to 525 pounds, making the load of twenty-four barrels weigh from 12,000 to 12,700 pounds, or in excess of 6 tons. The sketch, Fig. 2, shows the layout of this body.

A somewhat different form is used for flour barrels, as these require weather protection. Fig. 3 shows one manufacturers' idea of a flour barrel truck; this has the full top and enclosed rear, the front being of skeleton construction and the stakes in the middle of the side being removable for loading alongside of a platform. This feature is very often necessary, and in all cases is very handy, as it reduces the manipulation of the truck for either loading or unloading to a minimum. This really is a necessity for a class of bulky material which must be frequently handled but does not always take the form here shown. In many cases it takes the form of a gate, removable as a unit, which may be slid upward out of the way or may be hinged to swing outward or inward, the last being somewhat inconvenient where the truck is usually loaded to its full capacity. In Fig. 4 is shown the body built for a large wholesale grocery house which has the hinged gate. This gate was 36 inches wide; that is, gave a clear opening of 36 inches and was hinged to swing forward.

In whatever form used, this influences the construction to the extent of requiring stiffer and stronger posts than if the sides were continuous. Under this minor heading will come all trucks for transportation of flour barrels or sacks and wholesale groceries, also cement, sand, and similar materials in bags or barrels, wholesale drugs, paper in bundles and crates, furniture, etc.

Passenger cars vary greatly according to the various uses to which they are put. Thus purely sight-seeing or "rubber-neck" wagons require one construction, while wagons for general renting out to parties or clubs require a different one. For the first named use it has been found by experience that the cross seat car is the only successful type whether of four, five, six, or seven cross seats, and regardless of the number accommodated per seat. The other use, however, is one to which the tonneau or wagonette with longitudinal seats lends itself best.

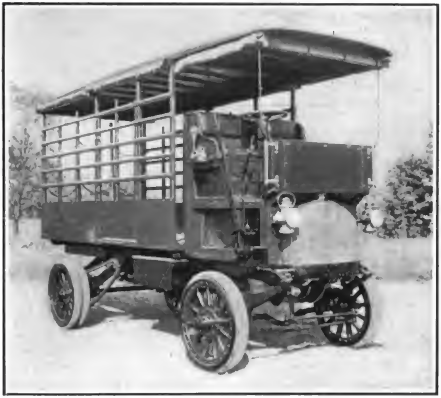


FIG. 4—BODY DESIGNED FOR WHOLESALE GROCER

These two latter, the tonneau and wagonette, with the enclosed car, being a combination of longitudinal and cross seats, are mostly used for estates, country clubs, or in any place where it is necessary to carry a large number of passengers who are of a necessity well acquainted among themselves.

Hotels and theaters on the other hand require vehicles for people who usually are strangers to one another and therefore require more privacy. This is obtained by making the cars much smaller and arranging the seats differently. The small size discourages the use of the vehicle when already occupied. Incidentally from the nature of the work the fillings of these cars are more luxurious. In this class we approach touring car practice most closely, as the smaller taxicabs with limousine and laudaulet bodies accommodating two, three or four and the larger enclosed bodies with accommodations up to ten or twelve, are but small or large adaptations of the ordinary pleasure car with limousine or other enclosed body.

Summer resorts located at some distance from the terminus of the transportation route, interurban passenger routes, and similar fields of usefulness, have developed an additional type of body which is midway between the passenger car and the truck, partaking of the construction of each. Thus no one of the uses previously mentioned would pay a profit, but this is taken care of by carrying, in addition to passengers, baggage, farm produce, freight, or by securing a contract from the Government to carry mail. Thus the combination car was developed, having a forward part for passengers enclosed or semi-enclosed, with a capacity up to ten people, well finished and equipped, also a rear part of truck construction, strong and rugged, well ironed and adapted for carrying heavy boxes or bundles, the carrying capacity varying from a few hundred pounds up to a probable limit of 1 ton or 2,500 pounds.

In this same category would appear the democrat wagon built with three or four cross seats of which two or three are removable, the driver's seat being fixed. The frame work of the body is carried up at the sides to a height of 8 or 9 inches, with a tail board of the same or a slightly greater height. Now by removing one or more of the seats, the rear portion may be utilized for freight or baggage. This kind of a body, as will be seen from Fig. 5, is of necessity a lower priced job all through and as a consequence its use is limited to suburban or country routes. Whatever the use to which it is put, the construction is radically different from that of the combination car just described.

The writer is familiar with one of these wagons in service between Milford, Pa., and Port Jervis, N. Y., carrying passengers, baggage, freight and produce. The record load for this wagon is said to be twelve passengers besides the driver, three trunks, three barrels, four bags of potatoes, three bushels of apples, three bushels of other farm produce, a broken wheel and a damaged radiator from another car, also four sacks of mail. This car had four seats and in the case cited the two rear seats were removed, leaving a space at the back of about 6 feet 6 inches long by 4 feet 6 inches wide, giving 30 square feet. It is needless to add that every bit of this was utilized.

A new entry into the list of passenger vehicle users has caused the construction of a new type of body. This is the real estate operator opening a large tract of land or a new suburb at a long distance from the office. Such operators need to carry possible investors to the land quickly, by a favorable route, and in large numbers. Ordinary touring cars seating five or seven were used but when the driver and real estate representative were counted out the capacity was reduced to three or five prospective customers. So the necessity arose for a large body with a capacity of not less than twenty, light, good looking and capable of good speed. Thus with this sized car, the real estate man was able to talk up the advantages of his proposition to twenty people at a time, re ducing his work to one-fourth of its former magnitude. These cars differ from the motor omnibus in that there would be no call for outside or upper deck seats, no necessity for a conductor, fares or frequent stops, and a desirability if not a real necessity for a speed twice that of the public service vehicle. No interior lighting would be necessary, as the car would never be used at night, neither would it be used very much or very hard, a mileage of about twenty representing a day's work, therefore the whole construction could be lighter than would otherwise be advisable.

The public service vehicle on the other hand is not only special as to body but differs as to construction, according to the use or service to which it is put. The cars used in New York and Philadelphia have a passenger capacity (seated) of thirty-four, sixteen below and eighteen above, and a conductor collects all fares, also attending to the stopping and starting of the car. A more recent installation in a smaller city has utilized the more up-to-date pay-as-you-enter car with the entrance at the front alongside of the driver who also attends to the fares, starting and stopping. Thus one employe per car is dispensed with and a corresponding increase in the profits, making a type of car suitable for smaller propositions and therefore of a much wider sphere of usefulness. Thus if we say that the larger car is suitable only in cities of 500,000 inhabitants and the smaller one in cities of 50,000 or over, the former is restricted to six cities while the latter's field is about ten times as extensive.

These two types, of course, call for two very different styles of construction.

There are many other types of body that would not come within the scope of this article, such as motor fire apparatus, municipal, army, navy and other government wagons. Also many styles which would come within this brief sketch, but to which as isolated cases we cannot give the necessary space, including undertakers, cemetery wagons, and the like. In general, we have touched upon the principal or mostly used bodies and have mentioned the conditions which affect the cost, appearance, material and construction of these.

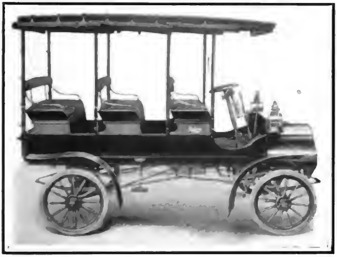


FIG. 5—LIGHT PASSENGER VEHICLE BODY

One item not yet covered is the matter of weight and its proper distribution over the wheels. In general, the correct distribution is one-third of the total load to the front wheels and two-thirds to the rear. This with bulky but light loads increases to one-quarter for the front and three-quarters rear. In exceptional cases we may even find good results from an even greater rear axle load This variation caused by the necessity for large space can only be met by increasing the size of the body. Now, the length of the wheel base may not be extended beyond certain well defined limits so that increasing the length of the body does not mean lengthening the wheel base in proportion, but rather a new and different distribution of the loading.

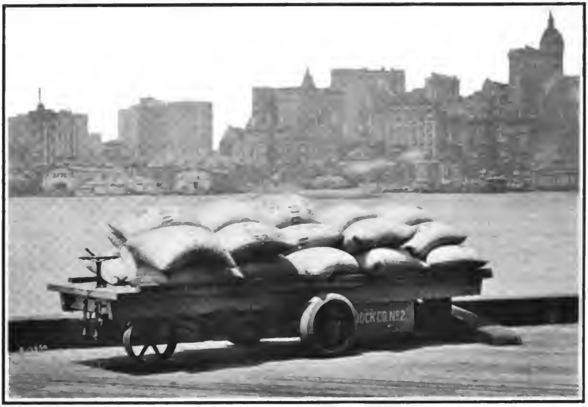
In laying out large bodies and the wheel base this proportioning of the weight must be borne in mind, and if the body as at first projected throws the load on either axle more than is proper the body dimensions should be altered to correct this or trouble will result. One way in which this may be done is by so proportioning the width and length that the latter will be correct for the desired distribution of load and the selected or perhaps the maximum wheel base. Thus, if a capacity of 550 to 600 cubic feet was required, suppose we fix the height at 6 feet 11 inches, this gives a floor area of 84 square feet. If this was laid out to be 6 feet by 14 feet and threw too much weight on the rear axle, then by widening the body to 6 feet 6 inches the length is shortened to 13 feet. If the foot saved thus still leaves a poor distribution we may go to a width of 7 feet for which the length would come down to 12 feet and so on until a really satisfactory arrangement is reached. A departure of more than 20 per cent. from the one-third and two-third rule will cause trouble, so this fixes the limits at two-fifths and three-fifths for very heavy loads and one-fifth and four-fifths for very light bulky loads.

In providing for this a manufacturer must consider everything. Thus to cite a case, one builder constructed a body for a furniture man in Brooklyn going to what he considered the limit in rear axle load, the arrangement giving about one-fifth and four-fifths distribution. Now the furniture man called for a five foot tail board which the unsuspecting manufacturer furnished. In service this was let down to a horizontal plane and loaded up just as heavy as the rest of the body. The additional length with its corresponding weight changed the loading to something like one-seventh and six-sevenths. This threw practically all of the added weight or load on the rear axles. The result was that the first set of tires which should have laster 18 months or at least 1 year wore out and had to be replaced in 6 months; similarly with a new set of springs, a new rear axle and various other rear axle parts. Of course the manufacturer received all the blame for this.

(To be continued)

An important exposition of American products is to be held in Berlin next year with the object of strengthening and stimulating our commercial relations with Germany. The offices of the American manager, Max Vieweger, are in the Hudson Terminal Buildings, New York.

The elastic limit of a well-tempered piece of spring steel is above 150,000 pounds per square inch. If a spring be made of soft steel and not loaded beyond its elastic limit, it would return every time to its original shape, but the deflection would not be sufficient to make a good spring; it would be hardly noticeable. The motor vehicle industry has forced the spring maker to depart from his old materials and methods.



ELECTRIC DOCK TRUCK USED FOR HANDLING SUGAR AND COFFEE BAGS

MOTOR TRUCK FOR FREIGHTING ON DOCKS

HARRY WILKIN PERRY

HOW conditions tend to evolve highly specialized productions is well exemplified in the "coffee district" in Brooklyn, just across the East River from New York's great financial center. Here are located the wharves of the New York Dock Company, where large quantities of sugar and coffee and other tropical products are discharged from the ships that come up the coast from the West Indies and South America.

For years the sacks of sugar and coffee have been moved about on the docks by means of low platform trucks, each hauled by a decrepit looking horse driven by a small boy. The trucks had a capacity of two tons and a load consisted of a dozen sacks of sugar or an equivalent weight in coffee or other merchandise. Heretofore the cargoes have all been moved from the vessels to the warehouses on these trucks under contract at a rate of 40 cents an hour for each truck and driver for the time actually spent in the work. When the outfit could be kept at work throughout a day of ten hours this meant $4, to be divided among the contractor, the boy, and the horse, to pay for their living and the depreciation of the equipment. If there had been steady work it would have been all right, but the work was very irregular, so that many days the trucks were not kept busy, although the horses ate just as much as when they worked hardest, and the boys had to be paid for their time. There proved to be so little money in the work that the contractor allowed both the trucks and the horses to wear out in the service, and the system was not satisfactory to either party to the contract.

When the situation was explained to an inventor and designer he set about solving the problem, with the result seen in the accompanying photograph. By occupation the inventor was an electric truck builder, but the conventional motor truck of two tons' capacity, built for use on the city streets, was much too expensive to meet the requirements. Something that would not cost more than half as much had to be devised.

It must be an electric vehicle, as gasoline trucks are not allowed on the docks under a ruling of the Board of Fire Underwriters, and it must have a low platform so that it would be easy to load and unload from the floor of the docks. Furthermore, the inventor was quick to see that it would be more convenient and save time if the motor truck could be run in either direction with equal facility without having to turn around, for the passageways between piles of merchandise were often too narrow to allow of turning a motor truck of such length.

All of these conditions are met in the new dock truck, which was produced primarily to meet the special conditions here presented, but which is equally well adapted for use as a baggage truck at railroad terminals and for hauling materials and parts from one department or shop to another in large manufacturing establishments. Two of the dock trucks have been giving very satisfactory results in experimental service on the coffee and sugar docks, and if they continue to do as well throughout the trial period of this type will be put into general use and smooth roadways will be laid along the docks by the warehouses for them to run on.

The platform of the trucks is 14 1-2 feet long by 4 feet wide, and is made of 2-inch oak planking laid on 2 by 7-inch sills. The top of the platform stands 28 inches above the floor or ground. There are four wheels, all of cast steel, but instead of being arranged in two pairs, as usual, there is a single wheel at either end and a pair of drive wheels at the center. Directly above the axle of the drive wheels the platform is hinged on a tubular axis, so that each half of the truck has a three-point support, enabling it to accommodate itself to uneven surfaces without breaking in the middle under load. The drive wheels are fitted with solid rubber tires 24 inches in diameter by 4 inches wide.

An Edison nickel-iron storage battery furnishes current enough on one charge to run the truck for 18 miles, sufficient for a day's work. The battery is carried in a battery box under the platform. On the opposite side of the axle and suspended from cross members of the frame is a large General Electric motor, which drives by sprockets and a Morse silent chain to a countershaft hung from the sills about midway between the drive wheels and the single wheel at one end. This countershaft is provided with a differential gear as in automobile practice to compensate the difference in rotation of the drive wheels when turning the truck, and a pair of side chains furnish the driving means from sprockets on the countershaft ends to the two rubber-tired wheels. There is a double reduction in the drive system, so that the gear ratio between the armature shaft and drive wheel is 14 to 1. This makes the working speed of the trucks four and a half miles an hour.

Front and rear wheels have flat steel tires 6 inches broad. Both are used for steering and are cross-connected under the platform by chains so that they turn in opposite directions, and tend to turn the truck on one or other of the center wheels as a pivot. All four wheels are held in pedestal guides that allow the axles to rise and fall vertically under the action of the springs. The pedestals for the front and rear wheels, however, rotate as a unit with the wheels on a turntable in steering. All weight of the platform and its load is carried on the wheels by coil or helical springs.

An automobile type hand wheel serves for controlling the steering wheels and a controller handle passes down through the steering post to an electric controller hung in an iron cradle under the extreme end of the truck. There is a similar controller at the other end and the steering wheel and controller handle can be lifted instantly from their socket and transferred to the opposite end of the truck so that it can be run in the reverse direction without turning around or driving from the rear end.

Complete with battery the dock truck, which is the product of the Lansden Company, of Newark, N. J., weighs 2,750 pounds. Figuring current at 6 cents per kilowatt hour, it can be run an average of 18 miles a day, or a total of 5,400 miles, at a cost of $216 for power during a working day of 300 days. Calculating all other probable expenses, including tire replacements, wear, repairs and repainting, the total cost of operation for a year should not exceed $511. This brings the cost per mile down to 9 1-2 cents, or less than 5 cents per ton mile, which is less than the cost of doing the work with horses. If the horse trucks averaged four miles an hour at 40 cents an hour the cost would be 10 cents a mile, or 5 cents per ton mile, since 2 tons are hauled to the load. The motor trucks, however, are capable of hauling large overloads, as they are so strong that it is almost impossible to load enough ordinary merchandise on the platforms to cause a breakage, and the hauls are too short for the motors to heat up much under an excess of work.

But even if the per-ton-mile cost of doing the work were the same, the motor trucks would have the preference because of their quietness and their perfect cleanliness when working on floors where sacks of foodstuffs must be stacked.

ENGLISH DECORATED WAGON

Many British users of commercial motor vehicles recognize the advertising value of the machine; our readers will recall a recent article on the subject. The machine here illustrated is a very good example of a motor wagon with decorated body. It is in the delivery service of Swan & Edgar, Ltd., a well-known London house, and is very smartly finished in white and vermilion, the swan being in bas relief. The chassis is the product of the French shops of Renault Frères and the body was built by Wilkinson of Uxbridge, near London. A long suburban route is covered by the van every day; leaving the owner's shop at 10:30 a. m. and returning about 5:30 p. m. It averages 70 miles a day, a distance entirely beyond the capability of a horsed vehicle. The owners report that the service is satisfactory in every respect and very economical.

ARTISTIC ADVERTISEMENT ON MOTOR VAN

AMERICAN MOTOR VEHICLE CONSTRUCTORS have always endeavored to produce quiet running in gas motor vehicles and have been surprisingly successful in this direction. Attention is called to this in an A. L. A. M. bulletin in which some of the principal causes of timing-gear noises are stated to be: inaccurate machine work on the crankcase, causing too wide variation in the distance between gear centers; unsuitable crankshaft and camshaft bearings, causing jumping of the shafts when the motor is running; inaccurately spaced and poorly designed gears, causing warping after the strain of cutting the teeth is removed. The utmost care must be taken in fitting up cam gears, and sometimes one or two of the gears may be changed to good advantage.

BOSTON SALVAGE CORPS USING MOTOR VEHICLES

UNDER the name of the Boston Protective Department, there is maintained in the city of Boston an organization incorporated in 1874, whose duty it is, so far as practicable, to discover and prevent fires, provide suitable apparatus and protect and save life and property in burning buildings or in buildings exposed to danger from fires. The organization is maintained jointly by all of the fire insurance companies and agents doing business in Boston, and all officers of such companies and local agents are members of the body corporate of the Boston Protective Department.

The department has right-of-way in streets and alleys when going to fires, as fixed by the city council and the fire commissioners, and subject also to the rights of the regular fire department. It is an essential part of the function of the Protective Department to arrive at a fire before the city fire engines and place waterproof covers over merchandise in stores and warehouses as a protection against smoke and water, and, when advisable or possible, to remove goods to places of safety.

In the performance of this work, of course time is of the utmost importance, and, recognizing the advantages of the speed of the motor car, the Protective Department purchased and installed in the station house of company No. 3 at 159-161 Roxbury street the Knox car shown in the accompanying engraving. This was placed in service in December, 1907, and during the following year proved so efficient that a second machine of the same make and type was bought and installed in July this year.

The thirty-fifth annual report of the organization, for the year 1908, shows that from December 6, 1907, to December 31, 1908, the truck responded to 395 calls. In going to fires at a distance of one mile the motor truck arrived in about two-thirds of the time required by the horse-drawn wagons of the same company, and at distances of more than one mile it arrived in about half the time. This saving in time made it possible for the men to spread 25 per cent more covers over goods at fires in suburban districts than before the addition of the motor truck, which is a very great increase in view of the fact that the motor truck represents only one-seventh of the vehicular equipment of the department. Besides the Roxbury station, where two one-horse wagons are maintained in addition to the motor car, there is a station for Company No. 1 at 40 Purchase street and one for Company No. 2 at 4 Appleton street, at each of which there are kept two two-horse wagons.

Besides the advantage of arriving sooner at fires, the same speed capacity of the car enables it to cut down from one-third to one-half the time of returning to the station, ready to respond to another call.

During the period mentioned, the truck traveled 1,929 miles to and from places of call, and altogether was driven a total of 2,455 miles. Consumption of fuel for all purposes amounted to 480 gallons of gasoline. The expense of operation, with liability insurance omitted, was 33 1-3 per cent less than for horse equipment. The actual cost of operation to the end of last year was $379, which includes both gasoline and lubricating oil, carbide, batteries, soap, tire chains and miscellaneous sundries. Corresponding maintenance items for a horse-drawn truck amount to $581 for a corresponding period. The latter amount includes hay, grain, shoeing, repairs to wagon, and so on. Neither sum includes insurance of any kind.

BOSTON PROTECTIVE SQUADRON WITH KNOX GAS MOTOR EMERGENCY WAGON

During the first five months the motor truck was in service it met with three accidents, due to the inexperience of the drivers, but since then there has been none. On December 10, 1907, it ran into a coal team, and on February 13, 1908, it skidded around a corner while answering an alarm. On April 5, following, while going to a fire and running in the street car tracks some distance behind a street car, the latter stopped. In turning out sharply to the right to avoid colliding with another car coming toward it on the left-hand track, the truck ran into a telegraph pole. The cost for repairs following these accidents is not included in the maintenance expense previously given. The only other failures to arrive at fires were on June 5, 1908, caused by a puncture; on

August 6 following, owing to breakage of a master link; and on August 7, when the ignition current short-circuited because of the absence of a cover over the battery or the coil. This last was the only time the truck had to be towed back to the station.

The present drivers are all experienced men and they test the machine every day.

The new truck just bought is to be located at the Roxbury street station with the first one, but from that station the motor trucks will be sent to fires in the downtown business section in addition to covering the city territory within a distance of three-quarters of a mile of the station on a first alarm and, on a second alarm, going into the outlying districts north and east for one and a half miles and south and southwest a distance of five miles. The service is confined to the city of Boston, except that upon special request the motor trucks will go to Brookline, Cambridge and other nearby places, which seldom happens.

Owing to their superior speed, they will save the Protective Department the expense of erecting additional stations in the outlying residential districts. If the new motor truck gives satisfactory service in the downtown district business section, it will be assigned to Company No. 1 on Purchase street, from which station the business district is now covered by two two-horse trucks. In that case, horse-drawn outfits will be abandoned altogether in all of the stations, it is said.

The new truck is the same as the first except that it has a wheelbase of 127 inches instead of 112, tires 40 by 6 inches instead of 34 by 5, double ignition, maximum speed of 30 miles an hour instead of 45, and that the equipment will include 25 waterproof covers instead of 15. Both machines are driven by four-cylinder 35-40 horsepower engines and weigh 3,610 pounds empty and 4,980 pounds fully equipped. They have sliding-gear, selective, four-speed, change-speed gearsets and side-chain final drive.

In addition to such regular automobile equipment as gas headlights and searchlight, with gas tank, horn, odometer and speedometer, they are fitted with a locomotive bell and a very complete outfit of fire-fighting appliances. This includes two hand extinguishers, twenty-five stock covers, six skylight covers, two axes, a door opener, a plaster rake, a ceiling pike, a 50-foot life line, two shovels, two iron pails, two lanterns, two extension ladders, one hook ladder, a top maul, two squilgees, a ball of marline, spare sprinkler heads, a box of tools, a tool bag, a nail bag and sundry extra parts.

MOTOR TRUCK IN GLIDDEN TOUR

It requires a good deal of confidence in the structural integrity of a commercial motor vehicle to enter it in a competition for touring cars which is scheduled to cover 2,600 miles. Such confidence has been displayed by the Rapid Motor Vehicle of Pontiac, Mich., by the entry of a Rapid gas motor truck in the Glidden tour this year. Although not competing for any award in this severe test the Rapid truck was officially entered to act as a tender and it carried No. 75.

This year's Glidden tour was held in the West, the start being made from the Hotel Pontchartrain, in Detroit, on July 12, and the schedule to be followed covered ten different states with stoppages or processions through the following cities: Kalamazoo, Chicago, Milwaukee, Madison, La Crosse, St. Paul, Omaha, Denver, and ending at Kansas City, July 30. As one might suppose the going over many miles of the route was exceedingly rough, trying indeed to the pneumatic tired pleasure cars, and the performance of the Rapid was more than creditable, and no doubt will serve to acquaint many, even in the motor vehicle trade, with the possibilities of the motor truck. The vehicle was in charge of T. P. Myers, of the home office, and it was a regular stock model. As the tour embraced sections in which no extensive accommodations for travelers are to be had, a special train of sleeping and dining cars, and a headquarters car for the officials, followed the schedule taken by the road vehicles and was available at all the night stops.

RAPID GAS MOTOR TRUCK USED AS TENDER WITH THE GLIDDEN TOURISTS

COMPLETE TEXT OF NEW YORK TAXICAB ORDINANCE

FOLLOWING is the text in full of the new taxicab ordinance as finally passed by the Board of Aldermen and signed by Mayor McClellan, of New York City. The ordinance goes into effect "sixty days after the appointment of the inspectors provided for by the measure," and as no definite time is set for the appointment of the inspectors, the actual date of the enforcement of the new law is in doubt.

At the Bureau of Licenses, under the Mayor's office in the City Hall, it was said that no move had yet been made toward carrying out the provisions of the law, which it was thought went into effect September 1. At the office of the clerk of ordinances it was said that copies of the law had not yet been published.

Inasmuch as the ordinance specifies that the rates to be charged shall be determined by the number of passengers each machine is intended to carry and not by the number actually carried, it seems likely to give rise to a popular misunderstanding. It fixes the rate for a two-passenger cab at 30 cents for the first half mile and 10 cents for each succeeding quarter mile, while for cabs intended to seat four passengers the rate shall be 40 cents for the first half mile. The great majority of all motor cabs at present in use in New York are built with a permanent seat for two passengers facing forward and with two small folding seats secured to the back of the driver's seat and facing backward tete-a-tete with the permanent seat. Evidently the legal rate to be charged by these will be 40 cents for the first half mile, whether occupied by one or four passengers.

Complete Text of Ordinance

AN ORDINANCE to amend sections 315 and 316 and 379 of chapter 7, title 2, Article 3 of the Code of Ordinances of The City of New York.

Be it Ordained by the Board of Aldermen of The City of New York as follows:

Section 315. Every person driving a licensed hack, or express (other than the person named in the license therefor), shall be licensed as such driver, and every application for such license shall be indorsed, in writing, by two reputable residents of The City of New York testifying to the competence of the applicant. No owner of a licensed hack or express shall employ an unlicensed driver under a penalty of ten dollars for each and every offense.

316a. Any meter, instrument or device by which the charge for hire of a licensed hack is mechanically calculated either for distance traveled or for waiting time or both, and upon which such charge shall be indicated by means of figures, shall be deemed a taximeter. Every vehicle upon which such taximeter is affixed shall be deemed a taxicab.

316b. Each vehicle upon which a taximeter is affixed shall be licensed and the owner thereof shall pay annually such fees as are hereinafter provided:

Each special taxicab, $10.

Each public taxicab, $10.

Each driver of a taxicab shall pay an annual license fee of two dollars. The owner or driver of any hack upon which a taximeter is affixed and who has duly procured a license to use or drive such vehicle according to the provisions of any ordinance hereinbefore enacted, may continue to use or drive said vehicle under such license until its expiration.

316c. There shall be under the direction of the Chief of the Bureau of Licenses such inspectors as may be found necessary to carry on the work hereinafter described, who shall be appointed by the Mayor and who shall be paid such compensation as shall be fixed by law.

316d. It shall be the duty of such inspectors to test, inspect and ascertain the accuracy of each and every taximeter affixed to or about to be affixed to any vehicle offered for hire and to measure, test and examine every wheel, tire, gear, shaft and every part of the mechanism of such vehicle which may affect or control the operation of such taximeter. An inspector shall mark and number each taximeter and vehicle which is approved by him at least once every six months and as much oftener as the Chief of the Bureau of Licenses may deem necessary, with some suitable device, which device shall be recorded in the office of the Bureau of Licenses. Any person may provide and keep on his premises a suitable and proper apparatus to be approved and marked by the chief inspector, for testing and proving the accuracy of taximeters and vehicles furnished for use by him and by which apparatus all taximeters and vehicles may be tested and proved. It shall be the duty of any person using or permitting to be used any taxicab immediately after any inspection or test, to effectually seal up the case containing the working parts of the taximeter and the case or cover of the gear which operates the distance recording apparatus, if it is not inclosed in the main part of the taximeter.

316e. Any person who shall use or permit to be used or who shall drive for hire any taxicab the seal of the case or cover of the taximeter or gear of which is not intact, shall upon conviction thereof by any city magistrate be fined for such offense a sum not exceeding ten dollars, and in default of paying any fine which is imposed, may be committed to the city prison not exceeding ten days, each day of imprisonment to be taken as a liquidation of one dollar of the fine.

316f. No license shall be issued to a taxicab unless an inspector shall certify to the chief or deputy chief of the Bureau of Licenses that the taximeter of and such vehicle have been duly inspected and approved.

316g. Such inspectors shall keep a register of the name of each person owning or using a vehicle upon which a taximeter is affixed, together with a serial number, size and make of such taximeter, the description, make and necessary dimensions of such vehicle, with the date and complete record of such inspection, and such record shall be open to the inspection of the public at all reasonable times.

Each inspector shall issue a certificate of inspection of taxicabs and shall keep a record of such certificates given on a corresponding stub. The certificates and corresponding stubs shall be numbered consecutively. All registers and books shall be public records and extracts may be certified by the Chief Inspector for use as evidence.

316h. Five thousand two hundred and eighty (5,280) feet shall be deemed one mile.

316i. No owner or driver of any taxicab which seeks patrons on the streets, avenues or highways of The City of New York, or occupies space thereon by reason of a permit or license from The City of New York, shall exact any fare from a passenger greater than set forth in the official schedule of rates hereinafter provided.

316j. The legal maximum rate provided in this ordinance and any schedule of rates promulgated by the owner of any such vehicle charging less than the legal maximum rate, shall be displayed in a conspicuous place on the inside of such vehicle.

LEGAL MAXIMUM RATES.

For each taxicab intended to seat two persons inside and driven by motive power, for one-half mile or any part thereof, 30 cents

For each additional quarter mile or any part thereof, 10 cents

For waiting time at the rate of $1 per hour.

For each taxicab intended to seat four persons inside and driven by motive power, for one-half mile or any part thereof, 40 cents.

For each additional quarter mile or part thereof, 10 cents.

For waiting time at the rate of $1.50 per hour.

For one piece of baggage, 20 cents.

No charge shall be made for handbags, dress suit cases, or child under five years of age by any taxicab.

316k. All rates of fare shall depend on the number of persons which each vehicle is intended to seat inside and not on the number of passengers actually carried, and no owner or driver of any taxicab shall use or permit to be used on such vehicle any taximeter which shall calculate or indicate a rate of fare which shall depend on the number of persons actually carried, under a penalty of twenty-five dollars ($25) for each offence.

316l. After such taximeter and vehicle have been duly marked, numbered and approved, any person who shall substitute and affix any other taximeter on such vehicle than that numbered, marked and approved for such vehicle, unless he immediately notifies in writing the Bureau of Licenses, giving the serial number, size, gear and make of such substituted taximeter and shall within forty-eight (48) hours after such substitution cause such taximeter to be marked, numbered and approved for said vehicle by an Inspector, and any person who shall use or permit to be used or drive any vehicle upon which such taximeter has been substituted and affixed, unless as aforesaid, and any person who shall tamper with, manipulate or operate any taximeter which has been duly marked, numbered and approved, or any part of the mechanism of such vehicle which controls or affects such taximeter so that the taximeter is defective or incorrect to the prejudice of any passenger, or who shall use or permit to be used or drive any vehicle the taximeter of or such parts of the mechanism of which have been so tampered with, manipulated or operated, or any person who shall use or permit to be used or drive any taxicab for hire, not inspected, examined, marked and numbered as hereinbefore provided for, shall, upon conviction thereof by any magistrate, either upon confession of the party or competent testimony, be fined not more than fifty dollars ($50) for each and every offence, and in default of payment of such fine may be committed to prison by such magistrate until the same shall be paid, but such imprisonment shall not exceed ten days.

316m. No person shall use or permit to be used or drive any taxicab for hire the taximeter of which shall be adjusted or installed in such manner or which shall be in such condition as to be over five per cent. (5%) defective and incorrect to the prejudice of any passenger, under a penalty of fifty dollars ($50) for each and every offence.

316n. No taximeter affixed to a taxicab propelled by steam, electricity, gasoline, compressed air or other motive power, shall be operated from any wheel to which power is applied, under a penalty of twenty-five ($25) for each and every offence.

316o. Each figure used to indicate the fare on a taximeter shall be of such size as to be legible from the rear seat of such vehicle, and each taximeter shall be placed in a position approved by an Inspector so that its face can be easily seen by a passenger from the inside of said vehicle, and after sundown such face shall be illuminated by a suitable light.

316p. All persons shall exhibit on demand, at all reasonable times, any taximeter or vehicle to any Inspector for the purpose of inspection. Any person offending against this section, on conviction thereof by any City Magistrate, may be fined for each offence a sum not to exceed ten dollars ($10), and in default of paying any fine which is imposed may be committed to the City Prison not exceeding ten days, each day of imprisonment to be taken as a liquidation of one dollar of the fine.

316q. If any passenger shall request an inspection of any taxicab, giving in writing a full statement of any trip made by him, upon investigation of said request the Chief or the Deputy Chief or the Chief Inspector of the Bureau of Licenses may order the owner of the vehicle complained against to withdraw the same from service until inspected and tested, and the same shall be forthwith inspected and tested; if the same, on being so tested, shall be found 5 per cent. defective or incorrect to the prejudice of any passenger, the Inspector shall order the owner to remove said incorrect taximeter. Any person who refuses to comply with or who disobeys said order or orders shall, upon conviction thereof by any City Magistrate, be fined for each offence a sum not to exceed ten dollars ($10), and in default of paying any fine which is imposed may be committed to the City Prison not exceeding ten (10) days, each day of imprisonment to be taken as a liquidation of one dollar of the fine.

Sec. 379. Except as hereinbefore otherwise provided, no person shall violate any of the regulations of this ordinance, under a penalty (not less than two dollars or more than) *of ten* dollars for each offence. No such violation shall be continued under a penalty of (one) *ten* dollars for each day so continued. Any person engaging in or carrying on any business herein regulated without a license therefor, or any person violating any of the regulations of this ordinance (shall be deemed guilty of a misdemeanor, and) upon conviction thereof by any magistrate, either upon confession of the party or competent testimony, may be fined not more than (two) and *ten* dollars for each offence, and in default of payment of such fine may be committed to prison by such magistrate until the same be paid; but such imprisonment shall not exceed ten days.

Sec. 2. The provisions of this ordinance shall take effect sixty (60) days after the appointment of the Inspectors, as provided in Article C.

Sec. 3. All ordinances or parts of ordinances inconsistent with this ordinance are hereby repealed.

HACKMEN SECURE AN INJUNCTION

In the furtherance of their fight against the motor cab business, the public hackmen of New York City, comprising about 1,500 independent cabmen, obtained an injunction on July 10 against the New York Taxicab Co. restraining it from picking up fares in the streets, at ball and polo games, at amusement resorts, and at all other places where the company does not have a special taxicab stand.

The order was granted upon the complaint of Attorney George B Bolbert, of 5 Beekman street, attorney for the cabmen, and was signed by Judge Stapleton, of the Supreme Court of the State of New York. The order restrained the company from occupying the public streets, particularly certain portions referred to specifically, under special hacking license; from engaging in a public hacking business on any portion of the streets of the city of New York; from soliciting and accepting for hire public passengers, and from placing and maintaing its vehicles in storage upon the streets, particularly at the points referred to in the complaint.

The hackmen allege that the taxicab company does not hold licenses permitting its vehicles to accept street hire, and that it is violating the law in picking up fares in the street and at places where it does not have special cab stand privileges. The attorney said that this is only the beginning of a series of similar suits to be instituted by the independent cabmen against the corporation cabmen who are forcing them to the wall.

The city ordinances provide for special licenses which allow cabmen holding them to stand in front of private property by arrangement with the owner or lessee of the property to the exclusion of other cabs, and for ordinary or public licenses which carry with them the privilege of picking up fares along the street. On account of the exclusive privilege granted by the special licenses, the cabmen holding them are permitted to carry passengers only from the properties in front of which they stand.

It is charged by the attorney for the hackmen that the taxicab companies have provided a number of their men with public licenses to do a "cruising" business, but that most of them are especially licensed to stand in front of hotels, restaurants or other public places, yet the chauffeurs of all are instructed, it is alleged in affidavits, to pick up passengers wherever they can get them. It is said at the office of the taxicab company, however, that only the cabs provided with public licenses pick up fares in the streets.

TAXICABS IN NEW YORK FITTED WITH SWINEHART CELLULAR TIRES

W. J. Moran, of 1 Madison avenue, an attorney who represents five of the leading taxicab companies, holds that some of the provisions of the license ordinance will hardly be sustained by the courts, especially that provision making it a misdemeanor for a private cab, as those stationed at hotels are called, from taking passengers on return trips, as for instance, after taking passengers to a station from picking up others there for another trip.

RED CAB COMPANY LOWERS RATES

Without waiting for the new taxicab ordinance to go into effect, the New York Taxicab Company, which operates 600 of the red Darracq taxicabs in Manhattan, announced a reduction of rates, beginning July 19, to 30 cents for the first half mile and 10 cents for each additional quarter mile, day or night, for any number of persons up to four, with no extra charge for "sending."

The company maintains fifty-one stands on Manhattan Island, from the Battery to One Hundred and Forty-fifth street, and in addition conducts a suburban service, with stands at Coney Island, Manhattan Beach, Edgemere, Far Rockaway and Long Beach, on the south shore of Long Island, and at Asbury Park and Deal Beach, on the New Jersey shore.

The new rates are the same as the rates originally established by this company when it started business, and are lower than the legal rates fixed by the new taxicab ordinance, which permits an initial charge of 40 cents for the first half mile for a cab intended to carry four passengers, as all of the Darracq cabs are built to do.

CUSHION TIRES FOR TAXICABS

A line up of taxicabs in New York City equipped with Swinehart cushion cellular tires is shown in the accompanying engraving. The tires on these cabs are what are known as standard 4-inch and 4½-inch size, which fit in the same rims intended for 4-inch and 4½-inch pneumatic tires, although the cushion tires are about one inch narrower on the face than pneumtaic tires of corresponding size. The makers have been equipping cabs with these tires on a maintenance contract, guaranteeing a mileage of from 2,000 to 4,000 miles greater than can be obtained from a pneumatic tire. The makers inform us that these tires usually outwear about two sets of ordinary pneumatics, and, of course, they eliminate delays due to tire repairs, an important feature in taxicab operation. The users report that the riding qualities of these tires compare very favorably with properly inflated pneumatics and that customers rarely notice that the cabs are equipped with cushion tires.

MINOR TAXICAB NEWS

The collection of mail by taxicab is being tried out in Atlantic City, where it is claimed that this method is cheaper than collection by horse and wagon. The experiment is being watched with interest by the Post Office authorities, and it is said that if it proves successful and satisfactory the plan may be adopted by the Federal officials for other large cities.

Under the name of the Buffalo Taxicab Company have recently been consolidated the interests of the Thomas Taxicab and Transfer Company and the Buffalo Taxicab Company. The former was organized in Buffalo to use Thomas taxicabs and began operations about the time the Buffalo Taxicab Company came into existence.

The Taxa Cab Company of New Orleans, Limited, has been incorporated to own and operate taxicabs and automobiles for hire and for the transfer of passengers and freight. Capital stock is fixed at $125,000, and the incorporators are Comus B. Penny, Edwin R. Thomas, Edwin L. Thomas, Marcus S. Brock, Arthur W. Pope, Pierre Crabtree, Luigi M. Vitoli, O. H. Miller and Percy J. Heines. It is evident, from the names of E. R. and E. L. Thomas, father and son, of the E. R. Thomas Motor Company of Buffalo, that Thomas motor cars will be used.

Ample taxicab service is to be provided for Savannah, Ga., by the Savannah Taxicab Co., recently incorporated with $50,000 capital stock. A first shipment of fifty cabs, to be followed by a similar number later, will begin to arrive the first week in August.

Ten gasoline cabs are now being used in Seattle by the Seattle Taxicab Co., which has been operating since March 1 last, and its equipment is to be increased at the rate of six cabs a week.

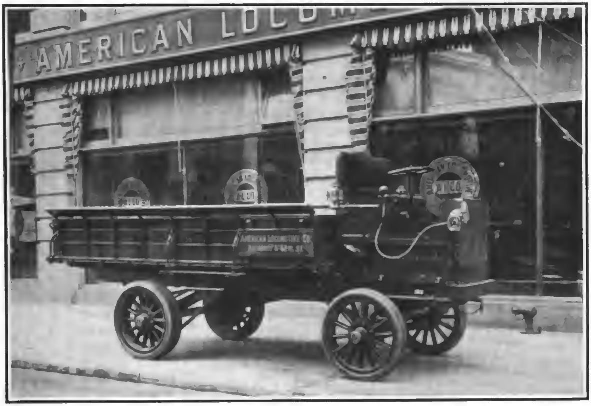
AMERICAN LOCOMOTIVE CO.'S GAS MOTOR TRUCK

REFERENCE has been made many times in these pages to the heavy, gas-motor, commercial vehicles built by the American Locomotive Company in its Providence (R. I.) plant, and now through the courtesy of officials of the company we are able to give details of the standard construction which are illustrated by the reproduction of a photograph of one of the trucks standing outside the New York salesrooms of the company. The truck as it is now built is known as "Model 5," and is sold under the trade name of Alco. It represents the result of long experimentation with different models of gas motor vehicle and experience with machines in actual everyday use in the service of express companies. Its load capacity is four tons.

A glance at the illustration will show that the truck is built upon what have come to be considered as American lines as distinguished from European, in that the motor compartment is located under the driver's seat. The special advantages claimed for this form of construction include: Decreased overall length of truck for a given loading space, shorter wheelbase permissible, more even distribution of load, and greater facility in handling in crowded streets; also the elevated position of the driver makes it easier for him to see what is ahead in picking his way through traffic.

Inaccessibility has been charged against the motor-under-the-seat type, and this, the company states, has been considered in the layout of the power plant so that it is practically as "getatable" as the motor-in-front type. A special feature of the design is the provision for the ready removal and replacement of the motor. The latter, by the way, is of the regular four-cylinder, vertical type, with cylinders cast in pairs, 3 15-16-inch bore, and 4 3-4-inch stroke, developing 24 horsepower at 1000 revolutions per minute. The motor is carried on a subframe extending to the extreme forward end of the truck, so arranged that, by removing the front cross member of the main frame and the radiator and disconnecting the gasoline pipe, control connections, clutch shaft, exhaust connection, and the bolts which secure the motor to the subframe, it may be drawn out through the forward end of the frame quite as easily as any motor can be removed from a touring car. Two men may remove the motor from the truck inside of a half hour. The motor is accessible from either side through hinged doors, and from the top through the floor boards.

The radiator and gasoline tank are elastically supported on springs, and flexibly connected to the motor. The radiator may be removed by simply taking off two nuts and withdrawing two bolts. The gasoline tank is protected from the heat of the motor by a sheet-iron plate below it, which provides an air space between it and the tank.



AMERICAN LOCOMOTIVE 4-TON GAS MOTOR TRUCK OUTSIDE NEW YORK SALESROOM

The entire truck is of extremely robust construction. The frame, axles, springs, wheels, bearings, and tires are made extra heavy, to provide for overloads, which unfortunately the manufacturer of trucks cannot always control.

The radius rods, brakes, all brake connections, and, in fact, all working parts have been made with unusually ample bearing surfaces and effective lubricating devices provided to minimize wear, and bushings provided in working joints wherever possible, to facilitate and cheapen cost of replacement.

Clevises and pins are unusually large and hardened, to minimize wear. No expense has been spared in the selection of materials best adapted to the service imposed upon them, nor in the accuracy of machining and fitting parts. One point in this connection which is of material advantage to the user is the complete equipment of jigs, fixtures, gauges, etc., at the factory, by means of which parts are made absolutely interchangeable. The quality of the product and the interchangeability of parts is further insured and controlled by a very rigid inspection.

In the construction of the motor high-grade materials have been freely used; cast iron for cylinders, aluminum for the crank case, Parsons' bronze for the bearings, special alloy steel for the crankshaft. The motor is supported by the upper half of the crank case, which is provided with openings for inspection of bearings. The lower half of the case is easily removable, and is independent of the main bearings. This is a desirable feature, as it permits adjusting the bearings independently of each other, and of the lower half of the case.

The cam shafts are of tool steel, with cams integral and hardened and ground to a master cam, making them absolutely alike. The valve plungers and rollers are also hardened and ground. The valve heads are of high nickel steel, which is not subject to the corrosive effect of hot gases. This insures durability, and lessens the danger of leakage due to warping, and pitting of seats. The wrist pins are all hardened and ground. Water circulation is effected by a gear-driven centrifugal pump.

Lubrication of the crankshaft and connecting-rod bearings is positively affected by a gear-driven pump and the cam-shaft bearings, pistons, and wrist pins are lubricated by splash. The timing gears are enclosed in a tight case and run in oil. Compression grease cups are fitted to the magneto and water pump bearings. Ignition is by jump spark current, being generated by a Bosch high-tension magneto, and the spark advance lever is suppressed so that the driver cannot use it wrongfully with consequent damage to the motor. The motor is also governor control with a maximum speed of 1000 revolutions per minute.

A multiple disc clutch is employed, the discs of steel and bronze, alternately, running in oil. The change-speed gearset is of the selective type, giving three speeds forward and reverse. It is carried on three point suspension and is fitted throughout with Hess-Bright ball bearings. The countershaft, with differential, is also fitted with ball bearings. Final drive is through side chains to the large forged sprockets bolted to the rear wheels.

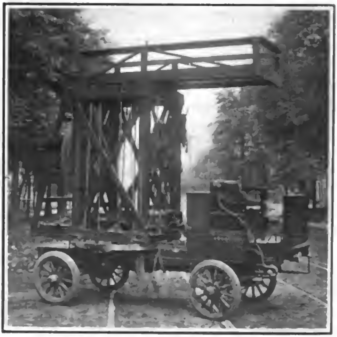
Duplicate sets of large brakes of the expanding type act on the interior of the drums carrying the rear sprockets; one set of brakes is operated by pedal and the other by a hand lever.

The steering gear is of the worm and sector type, irreversible, of ample proportions throughout, and with large wearing surfaces, and is provided with adjustable bushings on the worm and sector shafts. All the steering levers and knuckles are unusually heavy, with large wearing surfaces, bushed. The rod connecting the steering gear with the knuckle is provided with coil springs to relieve the steering gear of shocks. Hess-Bright thrust bearings support the front axle in the knuckles, rendering steering very easy. Timken roller bearings are provided in the wheels.

The steel used throughout the entire truck has had an especial scientific heat treatment to secure the best dynamic and wearing properties. The workmanship, of course, is guaranteed by the standing of the builders in engineering circles and by its high reputation for a fine product in the automobile field.

TROLLEY REPAIR MOTOR WAGON

Maintenance departments of trolley roads in cities and outside are making extensive use of motor wagons for emergency repairs in place of the slow-moving horsed vehicles. The question of time is a very important one when a break in an overhead wire blocks the traffic on an important street car line and causes the delayed passengers to fume and rage. A typical tower wagon in the service of the Rapid Transit Company of Minneapolis is shown in the illustration herewith. It was recently built in the local shops of the T. F. Robinson Motor Co., manufacturers of the "Gopher" commercial vehicle. This wagon is a compact and able machine, driven by a double-cylinder, two-cycle, 30-horsepower gas motor, located in a compartment under the driver's seat. A stoutly framed radiator occupies the place of a dash. The transmission system includes a sliding change-speed gear set giving three forward speeds and reverse, and side chain drive to the rear wheels. The chassis has a rated capacity of 4,000 pounds. The front wheels are 32 inches and the rear wheels 34 inches in diameter respectively, and fitted with 3 1-2-inch and 4-inch solid tires. The wheel base is 98 inches, so that the wagon can be easily turned in the street. The tower is built on a swiveling table and the usual extensive repair kit and supplies for trolley work are carried.

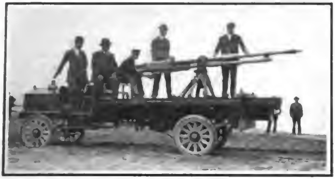


GOPHER TROLLEY REPAIR MOTOR WAGON

The Robinson company builds two sizes of motor trucks, one with a capacity of 2,000 pounds and the other of 4,000 pounds load capacity.

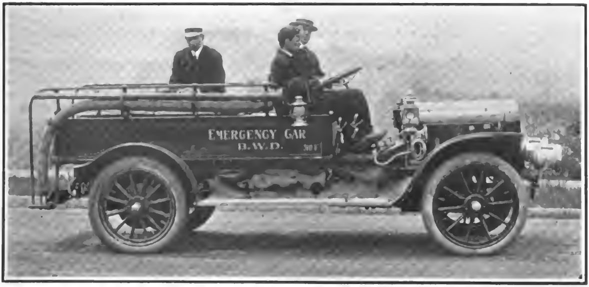
TRUCK AS PORTABLE GUN MOUNT

Although the United States military authorities have been extraordinarily slow to adopt motor vehicles for service use there is no doubt that at some time in the future Uncle Sam will become an extensive user, and consequently, a valuable customer of the American motor vehicle manufacturer. The accompanying illustration shows one of the rare instances in which the motor truck has been given an opportunity to demonstrate its effectiveness for offensive operations. The truck is a regular Packard 3-ton model, and on this is mounted a 3-pound automatic gun which can sustain a rate of fire of 100 shots per minute, the range being 3½ miles. Lieutenant Colonel O. W. Lissack, of the ordnance department of the United States Army, and Dr. S. W. McClean, designer of the gun, had charge of the test recently made, and they were assisted by the Standard Automobile Company, the Cleveland representative of the Packard interests.



PACKARD TRUCK USED FOR GUN PLATFORM

Shots were fired with the brakes of the truck set and also released. When the brakes were set the truck did not move and no shock was felt by those surrounding the gun on the truck platform. With the brakes released there was a slight movement on the recoil, but no shock. The designer of the gun recommends its use on a motor truck provided with suitable armour. Abroad, machines of the auto type have been fitted with machine guns.



WHITE STEAMER USED AS EMERGENCY WAGON BY BOSTON WATER DEPARTMENT

MOTOR WATER WAGON IN BOSTON

The latest addition to the city of Boston's automobile equipment is an emergency car for the water department, recently put in service by Water Commissioner William E. Hannan. The car is designed to cover practically the whole city, responding to alarms of breaks in mains and like emergencies. Quick work by the department employes in such cases often prevents great damage to the water system and the streets and surrounding property, as well as heavy loss of water. The car has a White steamer chassis and a large open body, in which is carried a complete equipment of repair tools and material. There are also facilities for carrying a force of men. In the photograph Commissioner Hannan is sitting on the side seat in the rear of the car.

CARS IN BRITISH ISLES

From a table just published by the Royal Automobile Club Vice-Consul A. D. Piatt, of Dublin, finds that the total number of motor vehicles of all kinds registered in the United Kingdom of Great Britain and Ireland on September 30, 1908, was 154,391, the particulars being as follows:

Of the total number 71,381 were motor cars for private use; 12,104 were motor vehicles for trade purposes; 5,880 were motor cars and motor omnibuses used as public conveyances; and the remainder, 65,026, were motor cycles. The following table shows the distribution of these motor vehicles:

	England and Wales	Scotland	Ireland	Total
Private use	63,240	5,231	2,910	71,381
Trade purposes	11,172	810	122	12,104
Public vehicles	5,461	384	35	5,880
Motorcycles	57,472	4,482	3,072	65,026
Total	137,345	10,907	6,139	154,391

The use of motor vehicles has just more than doubled in the United Kingdom within the past three years, the growth in their use being almost uniform in the three countries. Ireland seems to lag behind a little, but this is accounted for by the fact that the returns for six of the Irish counties are for December 31, 1907.

The Commercial Vehicle

Vol. IV August 1909 No. 8

Published Monthly by The Commercial Vehicle, Incorporated, at
1402 Broadway, New York City

Cable Address
Comveh, New York

Long Distance Telephone
425 38th Street, New York

H. F. Donaldson, President and Editor
H. W. Perry, Associate

Subscription Rates

United States, Canada and Mexico . . . . One Year $2.00
Other Countries in Postal Union . . . . One Year $3.00

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Entered as second-class matter, September 13, 1906, at the post office, New York, N. Y., under the Act of Congress of March 3, 1879.

AMERICAN AGRICULTURAL TRACTORS

Agricultural motors and gas-engine powered traction machines for use in farming, mining and lumbering districts might at first thought appear to bear only a remote relation to commercial vehicles as represented by motor trucks and delivery wagons. A little consideration, however, will show that they are nearly allied to the field of endeavor of the truck builder and are properly embraced in the category of industrial motor vehicles, which also includes such municipal vehicles as fire apparatus, street sprinkling wagons, street sweepers and garbage wagons, and also road trains of the Sampson and Renard types.

In all, the crux of the engineering problem is the power plant and transmission, which embrace the internal combustion engine and the spur gear change-speed mechanism, which differ profoundly from the steam engine and link motion reversing gear. Engineers and mechanics who have become familiar with the peculiarities of the gas engine are better qualified to adapt this class of power producer to the nature of the work to be performed than builders of steam engines or heavy farm machinery. Furthermore, the shop that is equipped with heavy machinery for the production of motor trucks for carrying ponderous loads of merchandise, materials and machinery has practically all of the necessary equipment for the production of the special parts that enter into the construction of motor tractors, such as structural steel frames, heavy gears, strong engine shafts, crank cases, and so on. The main part that is more closely allied with steam traction engine and agricultural machinery manufacture is the massive cast-steel wheels with wide tread and steel spokes, but these are readily obtainable and involve no special knowledge that is not possessed by any heavy vehicle plant. Of course, a good knowledge of the character of work to be performed and the mechanical constructions that have best met the requirements is essential, so that the truck builder should call to his aid the services of a man who has been actively interested in the production of this class of machinery.

In this issue of The Commercial Vehicle are analyzed the main characteristics of leading American motor tractors as now built, to be followed in a succeeding issue by similar descriptions of the best European types. A little study of these will show how the problems involved in this special class of machines are being met by the concerns that are now engaged in their manufacture on a commercial scale.

It may come as a surprise to many to learn that at least half a dozen large companies are already engaged in the manufacture of agricultural tractors in the United States, including the largest agricultural machinery builders in the world; that more than 500 of one make alone were in use last year in the vast farming territory west of the Mississippi River, and that one company is producing six models ranging from 8 to 30 horsepower, and another no less than ten models of single and double-cylinder engines rated at from 2 to 50 horsepower and weighing from 1,000 to 36,000 pounds. In no case is any well-known motor car or commercial vehicle manufacturer engaged as yet in the regular manufacture of such machines, although several have built experimental tractors, feeling their way into this new field.

Gigantic opportunities undoubtedly lie before the manufacturers who enter this market in the right way with a machine that will properly serve the purpose as a tractor for hauling plows and cultivators in the field and of developing power as a stationary engine for threshing and similar work. If it can be equally well adapted for hauling one or more loads of farm produce, ore or other material on the common wagon roads economically, so much the better.

Horseflesh is wholly inadequate to the task of cultivating and reaping the enormous wheat crops of the huge farms in the Far West. Steam traction engines have been used for years in this work, but latterly there has come an urgent call from all over the Western States and Canada for an engine of medium weight and increased power that would go over soft ground and pull plows; that would not require the hauling of fuel and water and endanger straw and haystacks and farm buildings by open fire. Although the gas engine tractor was developed almost simultaneously in England and America only about six years ago, its merits have been recognized quickly and it is already displacing many horses and steam traction engines on the farm. And as the economy and many other advantages of the mechanical cultivator are more widely understood, the demand will grow to astonishing proportions, if one may judge from the general use of the most improved sowing and planting machines, reapers and binders, threshers, and so on, and also the rapid introduction of stationary and portable gas engines for light power purposes, such as churning, pumping water, shelling corn, cutting feed and similar tedious and wearisome farm work.

Because of the vast area of farms in the Western United States and Canada, it is to be expected that a heavier and more powerful type of tractor will be produced and demanded on this side of the Atlantic than in Europe, where the leading agricultural motors are of a lighter and finer build than our own, but owing to the great diversity of farm work, a variety of special machines of different sizes, powers and types will be required, and this fact opens the field to any motor truck maker who cares to enter it.

PROVED THE TAXIMETER ACCURATE

That writer in the dignified and dependable *Evening Post,* of New York, who based a two-column "story" in a recent issue on the effort made to test the reliability of the taximeters fitted to the taxicabs of a company which announced a reduction of rates in a quarter-page advertisement in one of the leading morning dailies last month made a good guess when he wrote, "Something must have been wrong with that advertisement."

Something had. The advertisement, issued by the largest motor cab operating company in the city, announced a reduction to 30 cents for the first half-mile and 10 cents for each additional half-mile. It should have read, 10 cents for each additional quarter-mile, and the following day correction was made in the advertisement and attention called to the error in the news columns on the front page of the newspaper.

The man who rode ten miles in three different cabs to test the "clocks," as the meters are called by the cab people, observed that the instruments registered 10 cents more for every five blocks, and, as there are just twenty blocks to the mile, going north or south in New York, the charge was 10 cents for each quarter-mile.

The total amount paid for riding ten miles was $4.05. He thought he had discovered a short-distance meter when he observed that coming down Broadway it clicked up 10 cents a few feet short of every five blocks, probably forgetting that, as Broadway is a diagonal street, forming hypotenuses with the other avenues and streets, the blocks are slightly longer than on the parallel avenues extending up and down the island.

According to the writer of the article, the man who made this personal test of the meters reflected "that it would only have cost him as much ($4.05) to go to Philadelphia and return." He doubtless forgot to reflect how much it would cost him to go to Philadelphia and return in a horse cab—and how long it would take.

There appears to be a great tendency on the part of the cab-using public to "kick" about the high charges exacted for taxicab riding—which are just 40 cents a mile for one to four passengers after the first mile—without any apparent willingness to consider the superior speed and consequent economy in time over the old system that cost as much. It is this very element of speed that makes the charge for taxicab riding seem to cost dearly; one might pay a dollar willingly for a two-mile ride in a hansom that would take 20 minutes for the trip, yet feel that 90 cents was a high price to pay for a 10-minute ride in a motor cab of equal length.

There are still a few horse-drawn hacks and hansoms on the city streets, and one wonders why, if they are cheaper and otherwise as satisfactory as taxicabs, the people continue to ride in the latter and write complaining letters to the newspapers. It seems to be a trait of human nature, as soon as it begins to enjoy something that is a decided improvement over former conditions, to begin to complain strenuously over its alleged shortcomings.

* * *

NEW YORK'S TAXI LAW

Action of the largest operating company in New York City in voluntarily reducing its rates to a figure lower than required by the new taxicab ordinance passed by the Board of Aldermen, and putting its new schedule into effect several months before the ordinance will go into effect, should be conclusive proof that the "taxicab trust" so much heralded was a myth of the newspaper men's imagination, since the one company operates more cabs than the several companies absorbed by the alleged trust. Further, the head of the "trust" now contemplates lowering the rates of his company to the figures named by the ordinance to meet the competition without regard to the law.

As a matter of fact, it is maintained by the attorney for the taxicab companies that the new ordinance will not affect those cabs which occupy special stands in front of private property and operate under special licenses, and the chief of the Bureau of Licenses, to whom is delegated the pleasant task of carrying out the provisions of the new ordinance (the text of which is printed in full elsewhere in this issue) is himself in doubt on this point. The question is being submitted to the Corporation Counsel for an opinion, and may lead to a test in the courts for final determination.

* * *

Upon the conclusion of an extensive tour of the manufacturing sections of the country Alfred Reeves, general manager of the American Motor Car Manufacturers' Association, made the statement, last month, that after a careful compilation of figures received from the makers of axles, magnetos, frames and other parts, as well as from the complete vehicle makers themselves, the production during 1910 will reach a total of 200,000 machines. These plans, he says, may not be completely carried out, owing to the inability of parts makers to supply the demand, but in any case there is sure to be a 125 per cent increase over the production of 1909, which is placed at 70,000 pleasure cars and which has been insufficient to supply the demand. Of the 1910 total, 165,000 will be pleasure cars, 30,000 will be high wheel buggies made by carriage concerns, and 5,000 will be steam and electric carriages and commercial vehicles.

Mr. Reeves is, of course, very familiar with the progress in automobile construction, but comparatively few builders of commercial vehicles are members of the A. M. C. M. A., and we are of opinion that his estimate, if it is intended to include the output of shops outside the association's membership, is entirely too small so far as the business machine is concerned. One commercial vehicle builder alone—the Rapid company—has just announced its intention to build 5,000 vehicles during the coming year.

* * *

The summer meeting of the Society of Automobile Engineers will be held in Chicago, August 5 to 8, inclusive. Headquarters will be at the Illinois Athletic Club, on Michigan avenue, where a considerable number of those in attendance at the meeting from out of town can find accommodations. For members who are unable to find room in the Club the hotels in the immediate vicinity will be found convenient. As the Club is one of the best appointed in the country the visitors will find many opportunities for sociability and enjoyment between the technical sessions. A number of interesting papers will be read and discussed at the latter. This will be the first meeting to be held in Chicago and a large attendance is expected.

GETTING FAMILIAR WITH THE MOTOR TRUCK

A Discussion of the Component Parts of the Gas Motor Truck and Their Functions for the Information of the Buyer Who Has Had No Previous Experience with Power Driven Vehicles

STANLEY ROSEBERY

THE first thing to be done on receiving a truck or wagon from the factory is to examine it thoroughly for cracks, scratches, etc., in the body-work, and for any visible defects in the frame or mechanism, which might be occasioned by damage in transit. If none of these is present, it can be assumed that the vehicle is ready for service, and should run at the first turn of the starting-crank after the fuel, oil and water-tanks have been filled, in the case of a vehicle driven by gasoline or other liquid fuel. The next step is for the driver, or prospective driver, and also the man who will have charge of the vehicles if more than one are to be employed, to thoroughly learn the various parts of the mechanism, what their functions are, and how each part depends on the others in the operation of the vehicle.

To the driver of horse vehicles, and, in fact, to all those who have had no experience with motor vehicles, the mechanism of the majority of machines seems too complicated to understand, and the fact that there are such a number of parts is often very discouraging. This is all wrong; the operation of each part of the mechanism can be easily learned in less than a working day by even the unmechanical man, and as for any complication, it ceases to exist when the operation of the various parts is learned. It is not necessary to know the percentage of carbon in the cylinder castings, nor the number of turns of wire in the magneto or coil windings. Neither is it essential to know the origin of the steels employed in construction of the mechanism nor the thermodynamic laws involved in the operation of the motor. But there are certain lever and pedals, and the like, the movement of which causes certain actions to occur, or prevents other things from happening, and it is very necessary to be able to understand the uses of each lever or pedal in order to properly drive the vehicle and to prevent mishaps to it due to ignorance of the proper procedure at any time.

MAKERS USUALLY GIVE LITTLE INSTRUCTION

One of the chief reasons that there are so few really good drivers of motor commercial vehicles is the seeming indifference of the manufacturers to the proper instruction of those who are to handle their product. There seems to be a general idea that all that is necessary for a green hand to do is to read the catalogs, look at the illustrations therein, and the necessary knowledge has been acquired. Some catalogs embody an instruction book in their pages, and if there are any such applicable to the vehicle purchased they should be read over thoroughly. Considerable help will be gotten from them. Some manufacturers train the customer's man at the factory, by putting him as assistant in overhauling vehicles to be repaired, in the assembling gangs and allowing him to operate the type of machine when it is on the testing stand and road. If the factory is within two hundred miles of the customer's place of business, the vehicle is usually delivered under its own power, and the customer's man accompanies the factory employee on this trip, and thus learns much about the actual driving and control. But in the majority of cases, the manufacturer practically leaves the buyer to shift for himself, or the distance to the factory is so great that an expert cannot be spared for the instruction trip.

These circumstances should not deter anyone from using a motor truck. In fact, while instruction from the makers is very helpful it does not follow that no one can do without it, as there are many good drivers who have taught themselves and who have never been in a motor vehicle factory. As these were for the most part drivers of horse trucks and had little mechanical ability, it should not be hard for any driver to learn all that is necessary in the space of time before mentioned. The following points are here given as covering the various parts of the gas motor vehicles in use to-day.

COMPONENTS OF GAS MOTOR TRUCK

The gas motor vehicle, such as is used in delivery or trucking service, comprises a frame, a running gear, a power plant, and body. The frame is usually rectangular in shape, and is made of steel of channel or I-section and supports both the body and the power plant. The *running gear* consists of the wheels, axles, and springs, and serves not only to carry the frame, power plant, and body, but to provide means for propelling the vehicle on the road. The *power plant* consists of a motor or engine, furnishing the power to drive the vehicle; a clutch or means for connecting or disconnecting the motor from the rest of the mechanism as desired; a change-speed gear, and a transmission or arrangement whereby the power is finally communicated to the road wheels.

As regards the various parts of the running gear, they resemble similar parts on horse vehicles except that the wheels are sometimes made of steel plates instead of with wooden spokes and felloes. There is another part of the running gear on a motor vehicle which is very different from the corresponding part on a horse vehicle. This is the *steering gear*. As is well known, the steering wheels on a horse truck move with the front axle when it is desired to turn, but the steering wheels of a motor vehicle are on independent pivots which are connected by a bar so that when a turn is to be made the wheel on the inside of the turn is shifted at a greater angle than that on the outside, and the vehicle practically turns in a circle whose center is on a line drawn through the rear axle. This has the effect of allowing all the wheels to revolve easily during the turn and thus not interfere with the movement of the vehicle at all, which is not so with a horse truck, where the act of making a turn causes the outer front wheel to drag and makes the horse pull harder.

Returning to the vehicle motor, the principle on which a gasoline motor works is as follows: The motor consists of one, two, or four *cylinders*, in each of which is a *piston*, or part that moves to and fro within the cylinder. To each piston is fastened a *connecting rod*, which is fastened at the other end to a *crankshaft*. This crankshaft has one crank for each piston, the cranks all being connected together to form the shaft. The cranks and connecting rods are so arranged as to change the up-and-down or in-and-out motion of the piston into a circular one on the part of the crankshaft. A large wheel on the rear end of this shaft helps the shaft to revolve at a uniform rate of motion, and is known as a *flywheel*. To furnish the power to cause the pistons to move, a *mixture* of gasoline and air is sent into the cylinder as the piston moves outwardly, and this mixture is compressed in the cylinder as the piston moves in again. When the piston reaches the end of its inward movement, or *stroke*, as it is called, an electric *spark* is formed inside the cylinder and this causes an explosion, the force of which sends the piston outwards again. The flywheel causes the crankshaft to continue to revolve all this time, and brings the piston back on an instroke again, forcing the now burnt gases out of the cylinder into a *muffler* or device for suppressing the noise which the burnt gases make as they leave the cylinder. The movement of the piston outwards again, causes what is known as a *suction*, and the mixture enters the cylinder under the action of this suction. To admit the mixture into the cylinders, *valves* are provided, and also to allow it to escape after being burnt, and these valves are operated by *cams*—irregular-shaped projections from the cam shaft—so that each valve shall open and close at the proper time.

FUNCTIONS OF THE CARBURETER

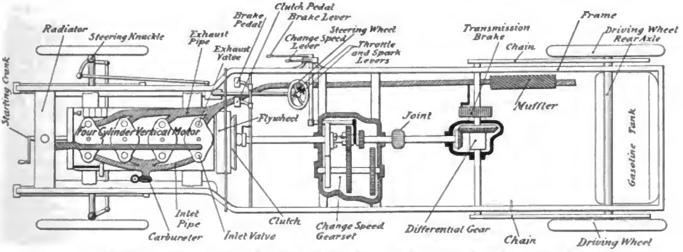
The mixture is formed in a special device called a *carbureter*, which consists of a tube of small bore in a chamber through which air is constantly flowing under the sucking action of the pistons. The tube is in communication with a small chamber containing gasoline, which, in turn, is connected with a large tank known as the *gasoline tank*. A hollow body, known as a *float*, floats on the surface of the gasoline in the first or *float chamber*, and a valve attached to the float opens or closes the passage from the fuel tank when the level of the gasoline in the chamber is below or above a given point. The carbureter is attached to the motor by a large metal *inlet pipe*, which also serves to convey the mixture to the cylinders.

Having sketched the principles on which a gas motor works, it remains to consider the various components of the motor and show how they may be recognized. Gas motor vehicles are usually built either with a *vertical motor* in front, or with a *horizontal motor* which is frequently placed under the body at the forward end. In the first-named type, the motor may be placed under a *bonnet*, behind which the *driver's seat* and body of the vehicle are located, or it may be contained in a motor compartment, over which the driver's seat is placed at the extreme front end of the machine.

Gas motors are either *water cooled* or *air cooled*, usually the former. A system of cooling is necessary because all the heat generated by the explosions of gas in the cylinders cannot be utilized in producing power (for reasons here unnecessary to discuss); consequently, unless some means of getting rid of this surplus heat were provided, the motor would heat up so that it would cease to run.

In the water-cooled motor the cylinders are provided with an enlarged portion extending downward some distance from their top or head, and known as the *water jacket*. Two pipes open into this jacket, one leading direct to an apparatus for cooling the water, known as the *radiator*, and the other leading to a *water pump* which, in turn, is also connected to the radiator.

In the air-cooled motor, as its name indicates, no water or other liquid is employed to cool the cylinders, but instead currents of air are directed upon the cylinders by a suitable *fan* or blower, the cylinders usually having projections on their exterior surfaces so that a more rapid and effective cooling will result than were the surfaces plain.



CONVENTIONAL PLAN VIEW OF THE CHASSIS OF A FOUR-CYLINDER GAS MOTOR TRUCK

A type of machine with motor-in-front under a bonnet has been selected for the sake of clearness. The more usual motor-under-the-seat type would show a plan drawing difficult for the novice to understand.

ADMISSION OF EXPLOSIVE MIXTURE

The valves for admitting the explosive mixture to the cylinder are called *inlet valves*, and are contained in small chambers on one side of the cylinders. The valves for permitting the escape of gas, after it has been burnt in the cylinders, are called *exhaust valves*, and are similarly located in pockets, either on the same side of the cylinder cylinders as the inlet valves, or on the opposite side. The former are connected with the carbureter by a branch pipe of comparatively small diameter, and the exhaust valve chambers are similarly connected to a branch pipe of much larger diameter. When the motor is running, the inlet pipe is cold, while the exhaust pipe is too hot to touch. The valve chambers, referred to, have caps which allow access to the valves for cleaning or removing the latter. The valves themselves have a long cylindrical stem or shank and a mushroom-shaped head, the stem only being visible from outside. The valves are lifted off their seats or opened by the action of the cams, which are attached to a shaft that runs inside a casing surrounding the crankshaft and which acts as a shield against dirt and also as a reservoir for oil for the *lubrication* of the working parts of the motor. The camshaft is driven by gears (two to one gears) from the crankshaft at half the speed of the latter, and these gears run in a casing at the front end of the motor.

As a rule, the *crank casing* and the gear casing, just mentioned, are made of aluminum and can be recognized by their bright silvery color. The crank casing is usually made in halves, the upper half carrying the crankshaft and supporting the cylinder, and the lower half containing oil wells or pockets.

ATTACHMENTS TO THE CYLINDERS

Each cylinder is also provided with a small cock in the head which allows of dropping in gasoline for starting the working of the motor in cold weather or for putting in kerosene for cleaning it. A *spark plug*, or device for causing the electric spark to pass between two platinum wire points, is screwed into each cylinder and wires run from each plug to a timing device, which is operated from the cam shaft so that in each cylinder the spark will occur at the proper time. Wires run from this *timer* to *coils* which raise the current to the proper strength to give the spark, and the current itself is obtained from a series of dry *batteries*, or from a storage battery, located in a box on the frame of the vehicle. Some motors do not use batteries, but obtain current from a *magneto*, an instrument which makes its own current when driven by the motor. In the inlet pipe there is placed a valve to regulate the amount of the mixture admitted to the cylinders and thus regulate the speed of the motor. This valve is known as the *throttle*, and is usually operated from the steering wheel or from a pedal on the footboards. When batteries are used, the time at which the spark occurs in each cylinder is varied at will by moving the timing device by means of a lever on the steering wheel and thus assisting the throttle in regulating the speed of the motor. As the gasoline motor will not start of its own accord when the throttle is opened like a steam engine, but has to be given the initial impulse by hand, the front end of the crankshaft is prolonged and a handle is fitted on it so that this impulse can be given by turning the handle, which is called the *starting crank*. There is a means for keeping the starting crank disconnected from the crankshaft so that it will not revolve uselessly when the motor is running.

RADIATOR FOR WATER-COOLED MOTOR

The radiator or cooling device is placed at the front of the vehicle, where the air can pass through it as the vehicle runs along. This takes the form of either a series of tubes fitted with fins, or of a great number of cells resembling those in a honeycomb, and enclosed in a framework. From the resemblance to the comb, this type of cooler has been given the name of honeycomb or cellular radiator. The water is forced to circulate through the jackets and the radiator by a pump driven by the motor, and is thus kept sufficiently cool to do its work properly.

The *clutch*, or means of connecting and disconnecting the motor from the rest of the propelling mechanism, is usually of the cone type, where the flywheel is hollowed out at its rear to form a cone in which hollow fits another corresponding cone attached to a shaft leading to the *change-speed gearset*. This latter cone has a spring which forces it into the hollow part of the flywheel, and thus couples the motor and change-speed gearset together. A pedal on the floor board of the vehicle withdraws the cone when operated, and is called the *clutch pedal*. There are other types of clutches in use, but they all operate on practically the same idea, and are similarly controlled by a pedal.

The change-speed gearset is designed to enable the vehicle to travel over hills and through sand or mud as well as on the level road. As the gas motor runs at nearly the same speed all the time to give its best effect, there will be road conditions met with often where the motor cannot drive the vehicle and maintain its effective speed (in revolutions per minute). The additional work to be done, due to the raising of the vehicle up an incline, for example, would slow down the motor, and it would soon stop altogether unless some means were provided for applying the power of the motor so that it would continue to move the vehicle, but necessarily at a slower rate of progress than on the level. The same conditions apply to a horse-drawn vehicle, which may be going along at a rapid trot on the level and when a steep hill is encountered the horse will be compelled to slow down to a walk—it continues to haul the vehicle, but more slowly than on the level.

METHOD OF CLIMBING HILLS

Therefore, to permit the engine to do its work on grades or on bad road surfaces, without overstraining or stoppage, a mechanism known as a change-speed gearset is employed. This is provided with shafts carrying toothed wheels, called gears. The closing of the clutch causes one of the shafts to revolve at the engine speed, and then by the engagement or meshing of a gear on this shaft with a gear on another shaft the latter is caused to revolve also. The gear on the shaft rotating at the engine speed is smaller in diameter than the gear on the other shaft, and so the speed of the latter will be less than the speed of the engine—proportionately as slow as the diameters of the gear wheels are to each other. Suitable mechanism (described later) conveys the power from this second motion shaft to the *driving wheels*, and thus, while these wheels will revolve more slowly than when the engine is driving them "direct," we are still able to retain the full power of the motor in moving the vehicle.

According to the surface of the road, the sizes of the two gears used is determined. For very steep hills, the small gear may have one tooth for every six of the larger one, which means that full power will be imparted to the gearset, for the motor will run six times as fast as the shaft carrying the larger gear. There are three of these sets of gears in most change-speed gearsets, and they are operated by sliding one of the gears along a shaft so that it will mesh with the desired larger gear. This is known as the *sliding gear* system, and is most commonly used on trucks and heavy delivery wagons. The gears which slide are controlled by a lever at the side of the driver's seat, and this lever is known as the *change-speed lever*.

This discussion will be made very much more intelligible by removing the cover from the *gear box*, containing the change-speed gears, and noting the altered relation of the gears on the shaft operated by the clutch and those on the second motion shaft when the change-speed lever is moved.

PLANETARY TYPE OF GEAR

Some heavy trucks and many light delivery wagons are equipped with *planetary* change-speed gearsets, in which the gear wheels are enclosed in a cylindrical casing or drum, which revolves with or around the engine shaft. The desired speed or set of gears is made to operate by a strap which is tightened around the drum carrying the gears. Two forward speeds are usually provided in this form. The lever setting the straps is similarly placed at the right side of the driver or a pedal is sometimes used for such speeds as are not used constantly. The illustration shows a sliding gear in place on a truck, looking down from above.

In the usual type of motor truck, power is transmitted from the change-speed gearset to the road wheels by *side chains*. The chains are carried on toothed wheels called sprockets, those at the rear end being of large diameter and secured to the road wheels, and those at the forward end of smaller size and fitted to the ends of a *countershaft;* these ends project beyond the sides of the frame of the vehicle. The countershaft usually extends outwardly from the change-speed gearbox and motion is imparted to it from the driving shaft in the gearbox by a pair of *bevel gears*. The bevel gear carried on the countershaft is mounted on a casing containing the differential gear, which permits the transmission of power to the driving wheels whether the vehicle is moving in a straight line or turning a corner. In the latter case every driver knows that the outer road wheel turns faster than the inner one, as it describes a greater arc of a circle. The action of this differential is entirely automatic, and does not need the attention of the driver in turning corners, as does the change-speed gear when climbing hills, for instance.

ANOTHER VARIETY OF FINAL DRIVE

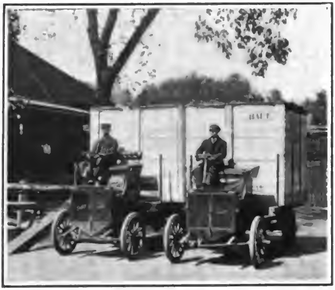
In some of the smaller vehicles, where a planetary transmission is employed, the final drive to the rear wheels is by a center chain and a live axle. In this latter the shafts which carry the road wheels are enclosed in the hollow rear axle that supports the weight of the vehicle body behind.

The steering gear is operated either by a wheel within easy reach of the driver or by a lever similarly situated. The small levers for controlling the throttle and time of the spark are usually placed on this wheel, while the pedals for the clutch and brake are placed beside the post which carries the wheel. Usually there are two sets of *brakes* fitted, one on the cross shaft operated by a pedal, and one on each wheel, acting together, and operated by a lever at the side of the driver. On some vehicles both sets are on the wheels.

The illustration will give a clear idea of the various parts of a motor truck and how they can be recognized. Their functions have been explained, and with the information derived from this article there should be no difficulty in anyone understanding the mechanism of a commercial vehicle.

TWO MACHINES AND ONE LOAD

A team of horses hauling a load is one of the commonest sights in the streets, but a team of trucks hauling one and the same load, such as is shown in the accompanying reproduction of a snapshot, is a sight rare enough to draw a crowd. The machines are light Franklin air-cooled gas motor wagons, and they are engaged in hauling a boxed automobile from the railroad station. It required considerable skill on the part of the drivers to transport this load, as on the straightaways it was necessary that the machines should travel exactly abreast and corners had to be turned so as to avoid change in the angular relation of the load to the truck bodies. The distance from the railroad station to the Franklin factory, where the load was delivered, was about a mile. The packing case measured about 15 feet in length and about 8 feet square; the gross weight was more than 2 tons.



TWO TRUCKS CARRYING A SINGLE LOAD

An important conference of good roads advocates will be held in Cleveland, September 21 to 23. Logan W. Page will represent the United States Government and among the other participants will be representatives of the American Automobile Association, the National Grange and the American Road Makers' Association. Congressman R. P. Hobson of Alabama will deliver an address on "National Aid and Post Roads."

Motor fire apparatus has been ordered or received during the last three months by the following cities, among others: Greenwich, Conn.; Trenton, N. J.; Elmira, N. Y.; Morristown, N. J.; Wheeling, W. Va.; Augusta, Ga.; Bristol, Conn.; Summit, N. J.; Springfield, Mass.; Lowell, Mass.; Rockford, Ill., and Springfield, Ohio.

TO INTRODUCE DE DION MOTOR TRUCKS AND CABS

TRUCKS, delivery wagons and taxicabs built by the great house of DeDion-Bouton, at Puteaux, France, are now being introduced into the United States by the DeDion-Bouton Selling Branch at 1649 Broadway, New York City. This company is well known as one of the oldest and largest motor car builders in the world, and there are more of its taxicabs and omnibuses in use in the big cities of Europe than of any other single make.

In this country the New York Transportation Co. has been operating two dozen of the DeDion, 34-passenger, double-deck motor 'buses for about two years with success. It is sufficient evidence that these have given satisfaction to learn that the same company only recently bought 250 taxicabs of the same make, the entire order to be filled by the end of the present year. The first twenty-five of the new cabs were landed in New York during the latter part of July, 100 more are to arrive in August, and the rest as fast as they can be shipped. Only the chassis are being imported from France, as the bodies are to be built in Boston. The chassis conform to the Transportation company's specifications for a new special American model, having four-cylinder, 14-horsepower motors with cylinders cast in pairs and with left-hand control.

The French house of DeDion-Bouton has offered to deliver to American purchasers 1,000 taxicab chassis in 1909, and it was the ability to complete so large an order in so short a time that decided the New York Transportation Co. to give the order for 250 cabs to this one house.

During the past month the American selling branch, of which George Ozanne is manager, has received for demonstration purposes one 1-ton DeDion delivery wagon, one 1½-ton truck and one 3-ton truck, and on August 10 will receive a 5-ton truck. Orders will be taken from these for chassis to be imported for delivery to customers. The delivery wagon is of the French type, with seat back of the dash, as in touring cars, and is fitted with pneumatic tires. It is driven by a four-cylinder, 10-horsepower engine, having the cylinders cast *en bloc*, that is in one piece instead of separately or in pairs.

The 1½-ton truck has an engine of the same type and power but is built heavier and stronger, geared lower and is fitted with solid tires, double on the rear wheels.

The 3 and 5 ton trucks follow the American practice of placing the operator's seat directly above the engine compartment. The 3-ton machine has a four-cylinder engine with cylinders cast in pairs and with a bore of 90 mm. and stroke of 120 mm., which by the A. L. A. M. rating would give about 20 horsepower, but is called 18 horsepower by the makers. The machine has a three-speed and reverse sliding change speed gear, double ignition with magneto and battery and shaft drive to the rear axle.

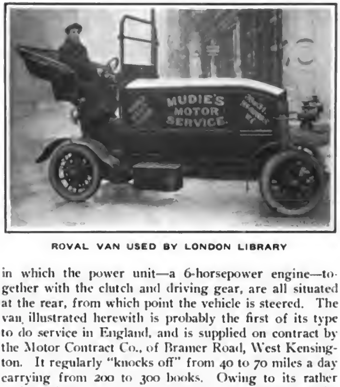
The 5-ton truck is driven by a 40-horsepower engine with separate cylinders.

All the trucks have the seat, engine hood and control furnished complete with the chassis, to which any type of body desired can be fitted in this country without making any change in the mechanism. Notwithstanding the heavy duty on imported machines, the DeDion-Bouton trucks, delivery wagons and taxicabs are being offered at prices that look very attractive on this side, especially in view of the reputation these vehicles have won and the nature of their design and construction.

In addition to being large manufacturers of motor omnibuses, delivery wagons, trucks and taxicabs, DeDion-Bouton build many special types of utility vehicles, such as mail wagons, street sprinkling and street sweeping machines, motor railway quadricycles, inspection cars and railway passenger coaches, motor pumping engines for fire departments, motor sledges for polar expeditions and small hand-drawn, two-wheeled carts with a little gas-engine driven pump for use by fire companies in small villages where regular fire apparatus is not maintained.

BOOK DELIVERY BY ROVAL CAR

An interesting example of the employment of a unique type of motorvan is furnished by one of the machines employed on part of the round served by Mudie's Select Library, Ltd., of 30-34 New Oxford street, London, W. C. This machine is the French make known as the Roval, in which the power unit—a 6-horsepower engine—together with the clutch and driving gear, are all situated at the rear, from which point the vehicle is steered. The van illustrated herewith is probably the first of its type to do service in England, and is supplied on contract by the Motor Contract Co., of Bramer Road, West Kensington. It regularly "knocks off" from 40 to 70 miles a day carrying from 200 to 300 books. Owing to its rather curious shape, the car presents an odd appearance; the front is ornamentally beveled off in an attractive curve, the body dimensions running to 5 feet 8 inches in length, 2 feet 6 inches deep, and a width of 3 feet 4 inches. Each day's route and number is affixed before starting out in the morning, "Service 12. Purley" being carried at the time the photograph was taken.



ROVAL VAN USED BY LONDON LIBRARY

Mudie's seem to be well satisfied with their motor van service supplied to them on contract, and as it was first instituted fifteen months ago, one must conclude that the arrangement is no experiment. The library manager says a motor vehicle is indispensable.

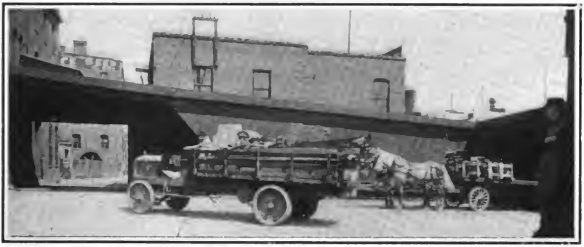
RECORD OF TRUCK OPERATION

In the generality of cases when figures are given as information concerning the gasoline and oil consumption of motor trucks the total gross mileage only is taken in account and so very scant knowledge is obtainable as to the amount of work actually performed, taking into account the empty and the partially loaded trips.

In the figures herewith a complete record of the load carried on the vehicles is given for every trip. Of course, the cost amounts thus obtained cannot be considered as absolute and definitive information for any service with vehicles of the same type. There is a variety in the requirements of each trade and of practically each firm, which precludes the possibility of a generalization from such figures. In some cases the mileage empty will be equal to the mileage with a full load, in other cases the proportion will be much more favorable.

The data here given is not intended to be a complete analysis of costs of operation. Its value is in the addition of the facts it sets forth to the mass of information already available, and which is essential in reaching any conclusions regarding the cost and capacity of a given service of motor vehicles.

The figures given were obtained in Detroit, Mich., with a group of Packard 3-ton trucks of the type represented in our illustration. These trucks were operated by the makers, and only as occasional service required. The figures are taken from the company's own books. The service itself was rather unfavorable to economy being irregular and no special attempt having been made to arrange for maximum efficiency in the handling of the loads to be carried.



PACKARD TRUCK CARRYING A LOAD OF FRAMES FOR AUTOMOBILE CONSTRUCTION

Tabulation of Performances of Packard Trucks

	One Day's Work				One Day's Work			
	Time Out	Time In	Load Out	Load In	Time Out	Time In	Load Out	Load In
Truck No. 4	7:00 a.m.	10:00 a.m.	0	6,000	7:00 a.m.	9:30 a.m.	0	6,500
" "	10:00 a.m.	12:00 a.m.	0	4,500	10:00 a.m.	12:00 a.m.	0	1,800
" "	1:30 p.m.	3:00 p.m.	0	6,000	1:00 p.m.	3:30 p.m.	0	6,000
" "	4:15 p.m.	5:30 p.m.	400	500	3:50 p.m.	5:00 p.m.	100	500
Miles 53.00. Gasoline 10 gallons. Lubricating oil 1 pint.								
Truck No. 5	7:00 a.m.	8:00 a.m.	100	1,100	7:00 a.m.	9:30 a.m.	200	6,500
" "	8:00 a.m.	11:00 a.m.	0	2,000	10:30 a.m.	11:30 a.m.	100	200
" "	1:00 p.m.	4:00 p.m.	600	7,500	12:45 a.m.	2:30 p.m.		8,000
" "	4:30 p.m.	5:00 p.m.	0	7,500				
Miles 42.1. Gasoline 7 gallons. Lubricating oil 2 pints.								
Truck No. 7	7:00 a.m.	10:30 a.m.	500	6,000	7:00 a.m.	11:30 a.m.	500	4,000
" "	1:00 p.m.	3:45 p.m.	4,000	7,000	12:30 p.m.	2:00 p.m.		8,000
" "	4:10 p.m.	6:00 p.m.		2,000	2:30 p.m.	5:15 p.m.		8,000
Miles 35.7. Gasoline 8 gallons. Lubricating oil 2 pints.								

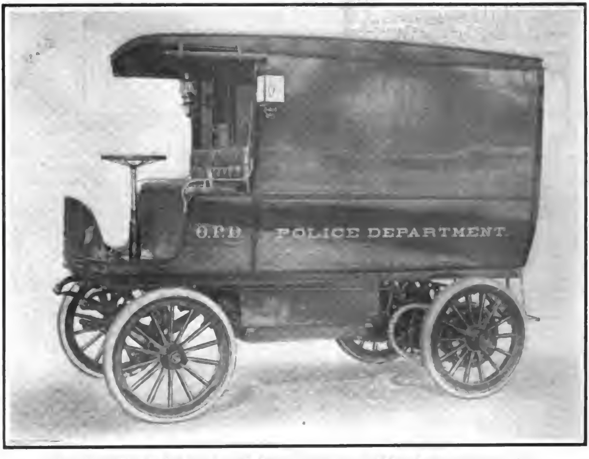
E. A. Ziegler, of the United States Forest Service, is authority for the statement that the hardwood forests of this country at present contain a little over two per cent of hickory. The original forest contained probably four per cent for the entire hardwood area. The total cut of hickory is now at least 350,000,000 feet per year, and if to this is added the hickory lumber cut for fuel and other wastes the total annual consumption would be about 400,000,000 feet. The true hickories are all found reaching their best development on the better, deeper, and moister soils of the river bottoms, coves and ravines. A careful study of the subject of hickory growth furnishes the conclusion that the hickories are slow growing timber trees; that the present average price for saw timber is much below the cost of growing; that the present supply comes largely from a forest where hickory is a small factor, and that the growing scarcity must soon raise the price to its proper level. The foregoing will doubtless be interesting reading to makers of all steel vehicle wheels.

ELECTRIC PATROL IN OAKLAND, CAL.

A very finely built electric patrol wagon in the service of the Oakland, Cal., police department is shown in the accompanying illustration. It was built at the plant of the Electric Vehicle Co., of Hartford, Conn. In appearance the machine is very smart, the color scheme being most striking. The running gear is dark red while the body is dark blue, the colors forming a most harmonious combination. The words Police Department are lettered along the sides of the panels in gold and the initials O. P. D. are lettered on the panels of the driver's seat in gold.

The frame is of channel steel and the wagon is of 2,000 pounds capacity. The wheels are 36 inches in diameter, fitted with 3 1-2-inch solid rubber tires. The power plant includes a 42-cell Exide underslung battery and two General Electric motors. The sides of the body are solid wood panels (an unusual design for a patrol wagon, but desired by the Oakland department), and on the inside are reinforced by heavy wire screens. There is a window 10 by 12 inches back of the driver's seat, which can only be opened or closed from the outside and when in position is secured by a patent catch. This window when not closed sinks into a well. A heavy wire screen effectually closes the opening. The interior contains two seats which extend along the sides and afford accommodations for 12 persons. Heavy gauge brass tubing is used for the hand rails, which extend from the roof to the rear step.

An 11-inch brass gong gives ample warning of approach and sounds 15 taps per stroke. The car is wheel-steered by hand wheel which is secured to a vertical pillar. The controller is of the horizontal type and is actuated by a side lever at the right of the driver's seat. The trimming is in black leather. A brass hand lantern is suspended from the ceiling of the car and electric side lights afford sufficient illumination of the roadway for night service. At a maximum speed of 15 miles per hour this car serves the purposes of the department.



WELL-EQUIPPED ELECTRIC POLICE PATROL WAGON IN SERVICE AT OAKLAND, CAL.

A NEW STEAM CULTIVATOR, designed by a native farmer of Upper Egypt and given a series of tests near Cairo before a special committee appointed by the Khedival Agricultural Society, embodies a new idea evidently possessing merit. At the rear of a heavy steam road locomotive or traction engine is a U-shaped frame of channel steel which supports the plowing parts and is pivoted to the rear axle so that it can be raised or lowered. The frame carries six metal disks mounted on shafts at right angles to the axle of the engine. To these are riveted half a dozen blades each, bent at right angles at their ends, and the disks rotate transversely to the direction of movement of the engine. They are mounted in three rows and in different longitudinal positions, so that as the engine moves forward and they rotate the blades dig up and pulverize the soil, giving it a thorough stirring and at the same time aerating it. The machine can cultivate to any desired depth down to one foot. In very compact, clayey soil that was difficult to work, the machine left a path 11 feet wide as well broken up as by two plowings with steam operated plows drawn by cables, and worked 1.58 acres of ground an hour to a depth of 9 inches. It burned 220 pounds of briquette coal per acre.

OF INTEREST TO VEHICLE BUILDER AND BUYER

The stockholders of the Rapid Motor Vehicle Company, Pontiac, Mich., decided last month to increase the capital stock of the company from $250,000 to $500,000, and W. C. Durant, chairman of the executive committee of the General Motors Company, of Flint, Mich., took a $200,000 share of the new issue. The officials of the Rapid company deny, however, that any merger with the General Motors Company is contemplated. Of the increased capital more than $150,000 will be expended in factory extensions and improvements. H. G. Hamilton, treasurer and general manager of the Rapid company, is authority for the statement that the company will market 5,000 commercial vehicles next year, an enormous increase on the present output.

An interesting exhibit at the New York store of the Diamond Rubber Company, 1876 Broadway, was a ball of crude rubber weighing 1,118 pounds. This was prepared in the Acre region, on the borders of Brazil and Bolivia, by Henrique I. Dos Santos and his two sons, who are experts in the gathering and shipment of rubber. In making this ball, 800 bottles, or 1,880 pounds of rubber juice or "milk" were used. It is said to be the largest single piece of rubber in the world.

Mr. H. B. Marshall, who has been for many years connected with the Chicago sales office of The Electric Storage Battery Co., in the Marquette Building, has recently been appointed contract agent, in charge of thta company's office at St. Louis, in the Wainwright Building. Mr. Taliaferro Milton, formerly contract agent of the St. Louis office, has been appointed engineer of the Chicago sales office of The Electric Storage Battery Co.

The Butler Motor Car Co., is contemplating the construction of a cement building for the care of commercial cars exclusively on Sidney Street, Cambridge, a suburb of Boston. This location is an admirable one, being near to traffic, and will occupy a long felt want for the Boston field. There is about 10,000 feet of land available to cover with a building which will accommodate at least 100 cars. The Butler Motor Car Co., has devoted its entire time to the commercial field, being distributor for New England of the Rapid wagons and trucks. Mr. L. B. Butler has nearly 100 cars in this territory. The plan for the Boston field is to establish a guaranteed service.

The manufacturers of the Klaxon sound-producing device, which is intended to replace the conventional horn on motor vehicles, have just issued a complete catalogue, showing different styles of the apparatus and their adaptation. A picture puzzle has also been issued to advertise the Klaxon. This apparatus is not unlike a horn in appearance; the sound is produced by the rapid vibration of a metal diaphragm actuated by a small electric motor. It is manufactured by the Lovell, McConnell Mfg. Co., of Newark, N. J. The Klaxon Company, 1 Madison Avenue, New York, is distributor for the United States.

The manufacture of springs for commercial motor vehicles necessitates the use of good materials and very expert manipulation in the forge, so that the requisite degree of flexibility may be assured under the widely varying load conditions met with in the operation of motor trucks and wagons. The Cleveland-Canton Spring Co., which has been making a specialty of commercial vehicle springs, as well as those for pleasure cars, has been obliged to construct a large addition to its plant in Canton, Ohio. This company occupied a foremost position in the manufacture of springs for horse-drawn vehicles during a long period of years. Before the marketing of motor vehicle springs was decided upon, a very exhaustive series of experiments was conducted and special plant laid down. This latter includes gas-heated kilns, which can be kept at a uniform temperature at all times, and in which the steel bars do not come in contact directly with the flame. Temperature-registering instruments were also installed, and special oil baths for tempering the springs. A rigid system of testing was also adopted, which starts with the steel bars when they are delivered at the factory and is carried through every step of the manufacture until the finished spring is ready for shipment. The tests in the earlier stages of manufacture are both chemical and physical, so that the composition and grain of the steel and also its ability to withstand severe deflection without taking a permanent set are all determined. Before the springs are finally passed, they are further tested to assure the true alignment of plates and eyes and to insure the required carrying capacity.

The plant of the Electric Vehicle Company, at Hartford, Conn., which for several weeks had been closed to permit the receivers to take an inventory, started up full blast last month. H. W. Nuckols, the newly elected general manager and vice-president of the Columbia Motor Car Company, which has taken over the business of the old concern, expressed himself most optimistically of the outcome, and assures many refinements in the 1910 output. A good part of the creditors have already been paid a dividend of 20 per cent. The original concern was one of the pioneer builders of electric commercial vehicles in this country.

E. Leroy Pelletier has been appointed assistant general manager of the Studebaker interests, with headquarters at the home office in South Bend, Mich. Mr. Pelletier is one of the best known "publicity" men in the motor vehicle industry, and has a record for very successful and original work. His advancement will be a source of gratification to a wide circle of friends in the industry.

A convention of superintendents of mechanical departments of the Packard Motor Car Company was held in Detroit last month at the immense plant of the company. At some of the meetings the executive, engineering, factory, sales and technical heads of the Packard company held lively discussions with the visiting experts, thus presenting all features of vehicle design, construction and maintenance from many points of view. Most of the Packard dealers' superintendents were taught their business in the Packard factory. It is one of the most important parts of the Packard policy to give efficient service to owners everywhere.

George T. Robie, president and founder of the Excelsior Supply Company, of Chicago, died last month after an operation for appendicitis. He was one of the leading business men in his line in the country.

The business of the Grabowsky Power Wagon Company, of Detroit, Mich., has developed so rapidly in the last six months that it was recently decided to increase the capital by replacing all remaining treasury stock for sale. This was immediately taken up by Detroit capitalists, and there is no more stock for sale of the $300,000, at which the company is capitalized. This increase in capital will be used in building an additional factory building, and in considerably increasing the output of the present factory to keep pace with the demand for this popular commercial car.

Mr. J. Kelly, well known to commercial vehicle users in the metropolitan district of New York, has accepted a position in the sales department of the General Vehicle Company, of Long Island City. Mr. Kelly was recently connected with the New York branch of the Firestone Tire and Rubber Company.

Mr. Frank C. Riggs, who has been assistant sales manager of the Packard Motor Car Co., has removed to Portland, Ore., where he will open headquarters for the sale of the Packard machines, including the 3-ton motor truck.

Half-hourly trips through Main street from the Union railroad station to Union Hill, in Alliance, O., are being made by a Mitchell car fitted with a 12-passenger 'bus body. The Auto Transit Co., which is operating it, expects to put on a second machine June 1 to serve the western part of the city.

On the first of last month the manufacture of Timken axles, hubs, and axle parts was transferred from the parent plant at Canton, Ohio, to the new and commodious factory in Detroit, where this branch of the business will be operated under the name of The Timken-Detroit Axle Co. The street address is 132-168 Clark Avenue, Detroit. The manufacture of Timken bearings, cup or cone parts will be continued at the Canton plant under the corporate name of The Timken Roller Bearing Co. This change or division of the well-known standard Timken products has been made necessary by the great increase in the business of the original company. With the greatly increased facilities the Timken interests will be well prepared to take care of all orders for their products. The officers of The Timken-Detroit Axle Company are W. R. Timken, president; H. H. Timken, vice-president; A. R. Demory, second vice-president and factory manager; E. W. Lewis, secretary and treasurer; H. W. Alden, chief engineer; F. C. Gilbert, assistant secretary, and W. H. H. Hutton, Jr., purchasing agent. The active management will be in the hands of Messrs. Demory, Lewis, and Alden.

An innovation in motor truck sales methods was introduced last month by the Motor Truck Co., of 244-250 West Forty-ninth Street, New York, when it organized a weekly meeting to which the users of Frayer-Miller motor trucks were invited to send their drivers and those in charge of the transportation departments of the company's customers. At these meetings the little difficulties experienced by drivers in their daily work are discussed, and the means for preventing a recurrence of them are fully explained by Engineer T. F. Burke. At each meeting some portion of the truck mechanism is discussed in detail, and questions are freely answered. This sort of co-operation between the sales office and the user should be of great benefit to the industry.

After looking over a number of proposed locations for an American plant, the Fiat Automobile Company, of Turin, Italy, has decided upon Poughkeepsie, N. Y. Certain liberal concessions were made by the local authorities, including dock rights on the Hudson River in perpetuity. The site of the new plant is about 30 acres in extent. Albert E. Schaaf, well known in motor vehicle circles in this country, has been appointed manager of the new plant. It is expected that the buildings will be finished and machinery installed ready for operation by the end of the year.

A new speedway for motor vehicles will be opened at Indianapolis, August 19, with a three-day automobile race meet. The circumference of the speedway is five miles. A grand stand capable of seating 15,000 spectators has been erected, and other extensive accommodations for visitors provided. Many valuable prizes have been hung up, including a silver trophy containing $5,000 worth of silver—coin value—donated by the Wheeler & Schebler Company, of Indianapolis.

A two-mile motor vehicle race track has been planned for Atlanta, Ga. The promoters expect to open it with a series of international events, November 9.

The Cadillac Motor Car Company, of Detroit, has been absorbed by the General Motors Company, the price paid being between $4,500,000 and $5,000,000. It is announced that there will be no change in the management or factory organization of the Cadillac Company. The General Motors Company now controls a number of plants. Those located in Michigan are the Buick Motor Company, Flint; Olds Motor Works, Lansing; Welch Motor Car Company, Pontiac; Reliance Motor Truck Company, Owosso; Rainier Company, Saginaw; Oakland Auto Company, Pontiac; Cadillac Motor Car Company, Northway Motor & Manufacturing Company, and Motor Parts Company, Detroit.

A compact special machine for reboring gas motor cylinders has been put on sale by H. B. Underwood & Co., 1025 Hamilton Street, Philadelphia. The cylinder to be rebored rests upon three adjustable sliding blocks which are planed true and at right angles to the cutterhead spindle. Clamps hold the cylinder in place after it has been centered, and as it rests upon the same face which is bolted to the crank case, original alignment is assured. It is immaterial whether the cylinders are cast separately or together; they are rigidly held without distortion.

Arrangements are being made for the equipment of street cars with Edison storage batteries. The work is going forward in an experimental way at the Orange, N. J., shops. It is the intention, also, to adapt the improved type of battery to taxicab service.

Hyatt roller bearings suitable for commercial vehicles are discussed in a bulletin recently issued by the Hyatt Roller Bearing Co. of Newark, New Jersey, and Detroit, Michigan. The bulletin is well illustrated by blue prints showing the bearings in section.

The Franco-American Taximeter Company has moved to spacious quarters on Seventh Avenue, southeast corner of Forty-ninth Street, New York City. From this point the company will direct the handling of all its business, which has hitherto been in charge of Lavalette & Company as rental agents. In the new building are extensive repair shops and a garage, which are calculated to care for the fast increasing business in a satisfactory manner. The Franco-American Taximeter Company has branches in Boston, Washington, D. C., Chicago, San Francisco, and New Orleans.

Demountable rims are becoming popular with taxicab owners, as they are easily carried and applied when necessary, and do not involve any increased wear on the bearings. The Doolittle Rim Co., of 1666 Broadway, New York, has just placed on the market a new rim for which advantages are claimed that it will not rust fast to the wheel, and that it can be contracted in place so securely that even in case of mishap it will retain its position on the wheel. The force that is used to contract the rim on the wheel is similarly effective in expanding the rim away from the wheel for quick repair.

Filing of articles of incorporation in July by the Meiselbach Mfg. Co., of Milwaukee, Wis., with $50,000 capital stock, and A. D. Meiselbach, S. Wallheim and L. W. Clough as incorporators, is taken as evidence that the Meiselbach company will remain in Milwaukee instead of removing to Sparta, Wis., where $30,000 capital had been interested as a bonus for the removal of the plant to that place. The company, which formerly built friction-drive trucks of medium capacity on a limited scale, will now actively begin the manufacture of light delivery wagons and commercial vehicles for all purposes.

Darracq taxicabs and pleasure cars will hereafter be handled throughout this country by Henry Ducasse & Co., 140 West Forty-second street, New York City, who have secured the exclusive American selling agency for Darracq cars.

Several new shops, to cost about $500,000, are to be erected as additions to the plant of the A. O. Smith Co., of Milwaukee, component parts makers.

In a circular issued by the Packard company, attention is called to the performances of Packard trucks in the services of the Standard Varnish Works, Staten Island, N. Y.; Goener & Co., Johnstown, Pa.; Paine Furniture Co., Boston, Mass.; Marshall Field & Co., Chicago, and its own shops in Detroit. In the latter service a truck ran 12,424 miles in 404 days, hauling a total of 6,431,947 pounds of freight.

Contracts have already been let for the decorative material to be used in Madison Square Garden, New York, on the occasion of the tenth annual motor car show to be held under the auspices of the A. L. A. M. The show committee consists of Colonel George Pope, chairman; Charles Clifton, of Buffalo, and E. P. Chalfant, of Detroit. Merle L. Downs is secretary, with offices at 7 East Forty-second Street, New York.

A neat pamphlet of pocket size has been issued by the Electric Storage Battery Co., of Philadelphia, discussing the history and development of the lead storage battery plate, with special reference to the standard "Exide" and "Hycap-Exide" batteries. It is well illustrated, and will be found useful for reference by battery men and others interested in the use of storage batteries.

The Commercial Vehicle

Vol. IV September 1909 No. 9

MOTOR WAGONS IN THE BOSTON CAMPAIGN

Usefulness of the Horseless Vehicle in Conveying Supplies and Munitions of War Demonstrated in the Recent Maneuvers in Massachusetts

C. F. MARDEN

BOSTON.—Motor vehicles thoroughly demonstrated their usefulness in army maneuvers under war conditions during the war game conducted in southeastern Massachusetts last month. The opposing forces were the Blue army, headed by Brigadier-General William A. Pew, Jr., M.V.M., and made up of Massachusetts militia defending Boston, and the Red army, with Brigadier-General T. H. Bliss, U.S.A., in command, and composed of members of the National Guard of New York, New Jersey, Connecticut and the District of Columbia and a few regulars. The Red army landed at New Bedford and Fall River and successfully invaded the State, theoretically capturing Boston. Both armies were equipped with motor vehicles of different sorts, but trucks predominated in the Red army.

The conditions under which the motor vehicles were tried out were as difficult as could be asked by the most skeptical army officer. Both armies were on the move every day, and the invaders had to march something like forty miles and change their base of supplies as the position of their forces changed. This necessitated the transportation of a large amount of food, ordnance supplies and camp impedimenta, and in this work the trucks showed their great superiority over horse-drawn army wagons. Not only were the conditions those of real war as far as getting about were concerned, but the weather helped to make the trial more arduous.

The first of the week it was very dry and while the State and other main highways were in good shape, the country roads were deep in dust. As much of the fighting was in the country districts, these dusty roads had to be used by the motor vehicles, and they plowed through dust, in places a foot deep, where horses could proceed only at a walk. Tuesday came a regular New England northeaster accompanied by heavy rain, which quickly changed the dust into deep, sticky mud. Wagons not infrequently were mired and had to be helped out, but the motor vehicles got along with the minimum of trouble, and saved the troops much discomfort and inconvenience by having the camp and other supplies on hand promptly when the army was ready to make camp.

The trucks used by the Red army were Autocars belonging to the United States army, and there were about a score of them. Their speed and heavy load carrying capacity undoubtedly contributed materially to the success of the invaders, for, instead of a long strung out baggage train to be guarded against capture, the trucks made it possible to keep the baggage train well up with the main army at all times, even when the mud was deepest. The trucks met the Red army when it landed at New Bedford and Fall River and took on big loads of supplies of all sorts. From then on during the progress of the army northward for a distance of about forty miles they were almost constantly in use, at times carrying soldiers. They were equipped with tops and had side seats.

The Blue army had very few motor trucks, but a Packard and a Frayer-Miller, upon which machine guns were mounted, and which were used by Battery A, M.V.M., did conspicuous work. The observing officers were surprised at the speed with which these trucks got about and the facility with which they could be brought into action. A commissary truck did excellent duty, and the White auto ambulance won much praise for speed in carrying soldiers who were taken ill on the field or in camp to the hospital. In one case it is said to have saved an officer's life by bringing him from the scene of the maneuvers to a hospital in Boston, where he was operated upon.

Attached to the division headquarters of the Blue army was a corps of White steam cars for the use of the commanding officer and his subordinates, and they were on the road most of the time day and night, carrying the commander or other officers from place to place in the widely scattered front, and in transporting despatches between division and brigade or regimental headquarters. Without these cars the commander never could have kept in such close touch with his forces. Members of the militia who owned cars brought them with them to the maneuvers, and at every regimental headquarters there were some machines that did good work in the actual operations, enabling the regimental commanders to keep in communication with different detachments and with the superior officers.

Motor cycles were used for scouting purposes, and while the results were valuable, the work of the motor cycle scouts of the Blue army was considerably overshadowed by that of the experienced regulars with the Red army. Veterans of Indian and Philippine campaigns in the Red army scouted through fields and woods on horseback while the motor cyclists were compelled to keep closely to the traveled highways. Several of the motor cyclists were captured in the early days of the "war."

The commercial value of automobiles in the war game showed itself no more distinctly anywhere than it did in the press division. Several hundred correspondents of newspapers in Boston, New York and elsewhere, and of weekly publications and magazines, were in the field, and while a few tried to do their work on horseback or on foot, the most successful were those who had automobiles. With their cars they were able to follow up the different engagements, accurately to determine the positions of the troops, learn the decisions of the umpires and other information and then dash away, perhaps several miles, to the nearest telephone or telegraph station. Never before was anything of the same magnitude and under similar conditions covered so completely, especially by the afternoon papers, which, when their correspondents had cars, were able to print the news up to the very minute of the close of hostilities each day. The umpires, upon whose decisions rested the results of the various skirmishes and battles, also found motor cars exceedingly useful.

At the close of the maneuvers General Leonard A. Wood, commanding the Department of the East, U.S.A., and chief of umpires during the war game, praised the work of the motor vehicles. He said that not only had the motor trucks proved more handy than the usual army wagon with horses or mules, but that heavier loads could be carried, and their use did away with the care and expense of horses. General Pew and General Bliss also were generous in their praise of what the motor vehicles had done during the week, particularly during the trying time on Tuesday, when it was almost impossible for anything else to make progress in the muddy roads.

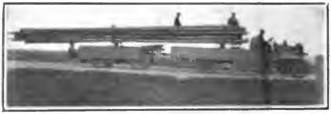
The actual official results of the employment of motor vehicles in the war game probably will not be reported for some time, but it is the consensus of opinion that trucks, at least, have won a prominence and demonstrated a usefulness which will be fully recognized in the United States army in future.

A very successful meeting of the Society of Automobile Engineers was held in Chicago August 5, 6 and 7. A number of interesting technical papers were read at the session, which was in charge of a special committee composed of Messrs. F. J. Newman, W. S. Noyes, H. K. Holsman, H. B. MacFarland and M. C. Diarmid.

GERMAN TRUCKS FOR COLONIAL SERVICE

Realizing the variety of work to which the commercial vehicle lends itself the German Secretary of the Colonies some time ago placed on order with the South German Automobile Works of Gaggenau for a number of trucks to be used in the German East African territories.

These machines are fitted with 45-horsepower vertical four-cylinder motors and have a six-ton capacity. They are chain driven and rubber tired; the propelling mechanism is of conventional design, but of rather exceptional strength. The trucks are intended for use as tractors in connection with a trailer, and will mostly be used to convey building materials for railroad construction in the colonies. This is a considerable improvement over the former methods of transportation by native carriers and oxen teams, from both the financial and the humanitarian viewpoints.



GERMAN TRUCK CARRYING TELEGRAPH POLES

An interesting contrivance shown in the illustration of one of the trucks with trailer was devised for the transportation of telegraph poles. Platforms mounted on pivots in a manner very much similar to the mounting of turntables are embodied in the truck and trailer construction. The poles to be transported rest on these, being securely held by chains at their truck end and free to slide in a vertical, rectangular frame at their trailer end, as clearly shown by the illustration. This construction was severely tested by the German government before acceptance, and it was found that any road turning could be negotiated with a load of telegraph poles up to 70 feet in length.

Fire Commissioner Nicholas J. Hayes, of New York City, is very well satisfied with the workings of the high pressure system of water mains laid in the business districts, which he says will eventually be the means of doing away with the present steam fire engine and substituting for it the motor hose wagon. In the course of his report he says: "The high pressure system installed in great business sections of Manhattan and Brooklyn, including Coney Island, in the last mentioned borough, placed in service during 1908 and operated jointly by the Fire Department and the Department of Water Supply, Gas and Electricity, and the further extension of which into other sections of these boroughs is eminently desirable, has added immensely to the effectiveness of the fire extinguishing means and facilities of the Fire Department, augmenting, as it does, by 35,000 gallons a minute the volume of water available in the high pressure zones of the boroughs of Manhattan and Brooklyn, and placing at the disposal of the department, in connection with that of the fireboat fleet, a flow of more than one hundred thousand gallons a minute, enabling the uniformed force to meet and overcome all conditions with which it may be confronted."

DEVELOPMENT OF THE GAS MOTOR FIRE ENGINE

Rapidly Increasing Appreciation of the Automobile Type of Fire Engine Evidenced by the Increasing Number of Installations in this Country and Abroad—Details of Some Notable Machines Recently Put Into Service

IT was bound to be only a question of time when the fire commissioners of American cities would realize the advantages of putting the engine of a self-propelled vehicle to work pumping water after it had carried hundreds of feet of hose to the scene of a fire, connected it with a hydrant, and then stood idly waiting for the slower horse-drawn steamer to arrive. There was from 30 to 70 horsepower lying dormant, inert, while the fire gathered headway with nothing further being done to check it in the very stages when it would be most easily extinguished. The situation is now clearly understood, and within the last two years numerous self-propelled pumping engines have been built and sold to city fire departments.

One of the most notable of the more recent ones is that bought last winter by the fire department of Lansing, Mich. It is shown in the photograph reproduced herewith (Fig. 1). The chassis is the regular Oldsmobile six-cylinder model with the exception that the wheels and truss rods are heavier than those fitted for runabout and touring car. The pump and gearing for it and the special body and its equipment were built and supplied by the Webb Motor Fire Apparatus Co., of Vincennes, Ind. The Olds engine develops 70 horsepower, capable of driving the vehicle 60 miles an hour. The pump has a capacity of 700 gallons of water per minute, and the body is designed to carry 1,000 feet of standard fire hose and accommodate seven men.

The equipment consists of two 3-gallon hand chemical extinguishers, two pickhead fire axes, one locomotive alarm bell, two 10-inch electric headlights, two side oil lamps, two fire lanterns, one stiff suction hose, four nozzle holders and two extension ladders.

The first real test of the new apparatus at an actual fire occurred on January 22, when the plant of the Perry Barker Candy Co. was gutted by fire in the early morning hours. The engine pumped water at top speed for more than four hours straight and the power of the streams thrown was in marked contrast with those coming direct from the water mains under city pressure. The motor fire engine fully demonstrated its efficiency and dependability at that time.

A week later the machine was given a severe traffic test following a heavy snow-fall and before the snow had become packed down in the streets by traffic. The engine was run over a circuitous course through the city streets approximating five miles in length, up a big hill and over a high bridge, making the run without accident or stop in about 20 minutes.

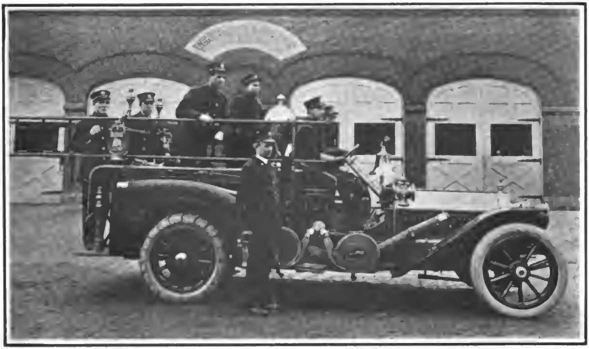


Fig. 1—WEBB ENGINE ON OLDS 70-HORSEPOWER CHASSIS, USED BY LANSING FIRE DEPARTMENT

AUTO CAR EQUIPMENT CO. CHEMICAL TRUCK

A type of motor fire engine admirably adapted for small cities and villages is the self-propelled chemical truck, such as the one recently installed at Ocean Grove, N. J., and illustrated in Fig. 2. These can be used where there is no adequate water supply or fire hydrant system and are especially suitable for extinguishing fires in their earliest stages and fires in small buildings where large volumes of water are not required. The extinguishing agent is the gas and liquid expelled from the two cylindrical chemical tanks carried on the rear of the frame, which have, in this case, a capacity of thirty-five gallons each. There is no pressure in the tanks until the turn of a handle causes the contained chemicals to mix with the water, whereupon high pressure is immediately developed by the generation of a large quantity of gas.

The machine illustrated is the product of the Auto Car Equipment Co., of Buffalo, which has made a study of the special requirements in such a machine. It is now a prominent part of the equipment of the H. E. Stokes Fire Co. No. 3, of Ocean Grove. In addition to the chemical tanks, there are 150 feet of hose, a pair of fire lanterns and a box of firemen's tools. There is room on the seat, running boards and rear step for twelve to sixteen men. The very substantial nature of the construction is evident, and it will be noticed that the wheels are fitted with solid rubber tires instead of the pneumatics more generally used. This should result in considerable economy in upkeep and increase the reliability, preventing possibility of delays on the way to a fire by reason of a defective tire. The vehicle is driven by a four-cylinder 40-50 horsepower motor and has the progressive type of three-speed gearset. Great care was given to every detail on this machine, each part being carefully tested so that the maximum speed could be made with it in safety.

After completion, the chemical truck was loaded with fourteen firemen and driven over country roads for forty-five miles in 53 minutes, to test the speed, reliability and strength. A main object also was to show the great advantage of a motor chemical truck for long runs, as when assistance is called for by neighboring towns.

Owing to the growing demand for motor trucks and delivery cars, fire apparatus and other special types of self-propelled vehicles, the Auto Car Equipment Co. recently found it necessary to erect a new factory, which it is now occupying at Elmwood and Hertel avenues, Buffalo. This is asserted to be the most modern and complete commercial car factory in the country, and the average output of vehicles is intended to be from 1,000 to 1,500 annually. The main building has a floor area of 175,000 feet.

LOCOMOBILE CHEMICAL ENGINE

Greenwich, Conn., recently celebrated the arrival of the new chemical engine built by the Locomobile Co. of America, which had previously supplied chemical engines to Newark, N. J., and Bridgeport, Conn.; a motor hose car to Waterbury, Conn. (Fig. 3), a combination chemical and hose car to New Bedford, Mass., and a motor pumping engine to the fire department of St. Louis, Mo.

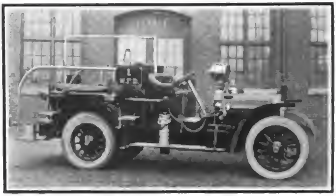


FIG. 3—WATERBURY'S LOCOMOBILE MOTOR HOSE CAR

The latest chemical engine, delivered to Greenwich, is mounted on a 40-horsepower Locomobile chassis, and has a total weight of 5,000 pounds. Although it carries heavy equipment, it has demonstrated its ability to travel fifty miles an hour and climb the steepest hills in the State in good time. The fire-fighting apparatus consists of two 35-gallon tanks for chemical solution and 250 feet of 1 1-4 inch hose. The flame extinguishing spray is generated from sulphuric acid and bicarbonate of soda, which are mixed automatically in proportions of one quart of acid to six pounds of bicarbonate of soda in thirty-five gallons of water. It requires four minutes to exhaust one tank, and during this interval the other tank can be refilled and made ready, thus insuring a continuous stream for an indefinite period. A large searchlight and a regular complement of hooks, axes and hand extinguishers are also carried.

WEBB PUMPING ENGINE

A more energetic campaign for the education of the fire commissioners and other city authorities regarding the merits of self-propelled fire apparatus, and for the actual introduction of the machines, has been carried on by the Webb Motor Fire Apparatus Co., of Vincennes, Ind., than by any other one interest in the country. After

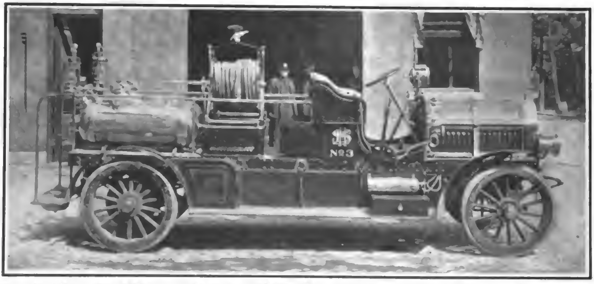


FIG. 2—OCEAN GROVE'S AUTO-CAR 40-50-HORSEPOWER CHEMICAL ENGINE FITTED WITH SOLID TIRES

establishing a factory at Vincennes for the exclusive purpose of manufacturing motor fire apparatus, the company began giving demonstrations with motor chemical engines and pumping engines in all the cities and towns throughout the country where the authorities showed any inclination to consider the adoption of such apparatus upon a convincing demonstration of its superiority over the horse-drawn engines and hose carts. In this great work the machine, shown in Fig. 4, has been sent to all parts of the country, visiting and giving demonstrations from New York to Los Angeles and from Minneapolis to New Orleans. It has traveled more than 7,500 miles under its own power in going from one city to another within a reasonable distance by wagon road and has been the means of converting the mayors, aldermen, fire commissioners and fire chiefs of dozens of cities to believe in the unquestioned superiority of this type of machine over the horse-drawn steamer.

In a demonstration made in New York City last March, which was watched by Deputy Fire Commissioners Wise and Whitney, the engine threw a stream 135 feet into the air under a pressure of 250 pounds to the inch, and when a second stream was cut in, the two streams rose to a height of more than 100 feet. The test was made at the Brooklyn repair yards, at Bolivar and St. Edwards streets.

During a test made in Trenton in February before the members of the Fire Commission and of the Fire Committee of Common Councils, the engine responded to an alarm turned in at 10 o'clock A.M. at the house of Fire Engine Co. No. 1, on West Hanover street, starting simultaneously with the steam fire engine, and arrived at the fire box and was pumping a strong stream of water over the Washington monument inside of four minutes. The monument is 160 feet high. It was at least five minutes later before the horse-drawn steamer arrived and had a stream started, and then the water came gradually, and it was some time before it reached full height, which was then only about 130 to 140 feet. The Webb engine developed a water pressure of 210 pounds and played a 1¼-inch stream, whereas the steamer showed a pressure of 290 pounds and threw a stream 1½ inches in diameter, which accounts in some measure for the difference in height of the two streams. The steamer carried only the usual five pounds pressure when it left the engine house, and as the run was short some time was consumed after reaching the monument in getting up steam.

From the monument the motor engine went to the National Bank building on Broad street, and in forty seconds after arriving at the fire plug a stream was being played over the building, which is 125 feet high.

The machine had made the run from New York to Trenton for the test, a distance of 59 miles, in 3 hours 5 minutes, with 20-minute stops each in Elizabeth and New Brunswick, making the actual running time 2 hours 25 minutes. The tests were in charge of A. C. Webb, designer of the engine and president of the company, assisted by D. A. Woodhouse, New York agent for the manufacturer.

The machine is built on a Thomas chassis and has a speed of 60 miles an hour, it is claimed, with a horsepower rated at 70. There is capacity in the body back of the pump for carrying 1,000 feet of standard fire hose, and the pump has a capacity of 700 gallons of water a minute. Seven men can be accommodated on the machine. As part of the equipment there are two 3-gallon hand chemical extinguishers, two fire axes, two lanterns, a complete set of tools, one stiff suction hose, four nozzle holders, a locomotive fire bell, two brass oil torches and a pair of 10-inch electric headlights

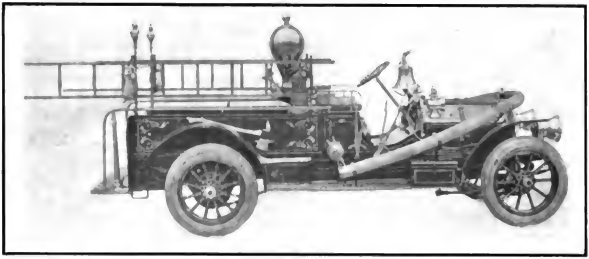


FIG. 4—WEBB DEMONSTRATING PUMPING ENGINE ON THOMAS 70-HORSEPOWER CHASSIS

In England a very similar campaign to that of the Webb company in this country is being conducted by Dennis Brothers, Ltd., of Guilford, Surrey, who put the motor pumping engine shown in Fig. 5 on the road last winter for demonstration work. After competitive trials with other makes a first order for a duplicate was received from the city of Bradford. The new Dennis fire engine has toured the country giving demonstrations to various bodies, and in one held in Surrey it was seen that while connected with a hydrant giving about 75 pounds pressure a stream reaching to the top of a four-story house was thrown with a 1¼-inch nozzle, the pressure shown on the gauge on the delivery of the pump being 125 pounds, the length of both suction and delivery hose being about 200 feet. Further tests were afterward made with water drawn from the river, and with a 1 1-16-inch nozzle and 50 feet of hose (2 3-4-inch size), the pressure being 92 pounds, a four-story stream was again given.

Dennis Brothers, who claim to be the oldest motor firm in England, having had ten years of motor engineering

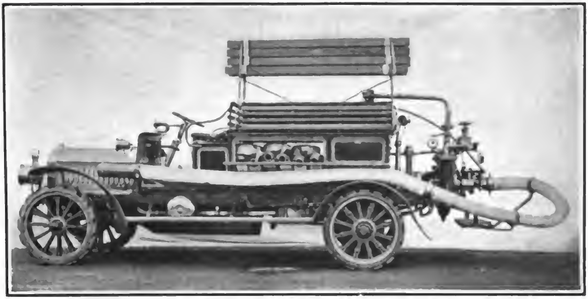


FIG. 5—DENNIS (ENGLISH) PUMPING ENGINE ON 40-HORSEPOWER CHASSIS WITH BLOCK TIRES

experience, and have placed hundreds of commercial vehicles on the market that are being used successfully in all parts of England, built the motor fire engine complete in their own works. It is fitted with a four-cylinder engine that develops 40 horsepower at 1,000 revolutions per minute and drives through a leather-faced cone clutch and four-speed and reverse sliding gear transmission carried in an aluminum gear box on the rear axle. Drive is direct on third speed to the live axle through a worm and gear mechanism that has been used successfully by Dennis Bros. on their other vehicles, and is guaranteed for two years.

Unlike American motor pumping engines, the pump in the Dennis is placed at the extreme rear end of the frame, as shown in Fig. 6, and is of the centrifugal high-pressure type, called frequently the turbine type. It is the product of the well-known firm of Gwynnes, Limited, London, and has the important feature that the water enters equally on both sides, so obviating end thrust. It is capable of discharging 350 to 400 gallons of water per minute at sufficient pressure to throw two 7-8 or 1 inch streams 120 feet into the air. This pump is driven by a steel shaft which is situated just above and parallel to the propeller shaft of the car, and is itself driven off the clutch shaft. The pump is self-filling, so that all that is required is to drop the suction pipe into the water, start the engine, and in a few seconds the pump is in full operation. Where water is carried under pressure in mains the fire plug can be connected directly to the suction of the pump and the pump will add to the original pressure its own pressure.

The body of the machine is arranged to carry 400 feet of 2 3-4-inch delivery hose, and a complement of fire tools in a separate locker. Garden seats are arranged to seat eight men sitting back to back over the hose compartment. A 20-gallon gasoline tank is disposed under the driver's seat. On a support above the firemen's heads are carried ladders of the elliptical truss telescopic type generally used in European countries. They measure 36 feet when extended.

A noteworthy feature is the fact that solid rubber block tires are fitted. These are not incompatible with a machine whose maximum speed on fourth gear is only 30 miles an hour.

A German pumping engine recently demonstrated in Berlin has a high-pressure turbine pump mounted just back of the driver's seat on a 42-horsepower Daimler-Marienfelde chassis. The pump is driven off the upper gear shaft by means of gearing and a jaw clutch, and can deliver 400 gallons per minute to a height of 197 feet. To insure immediate action, a priming tank is provided.

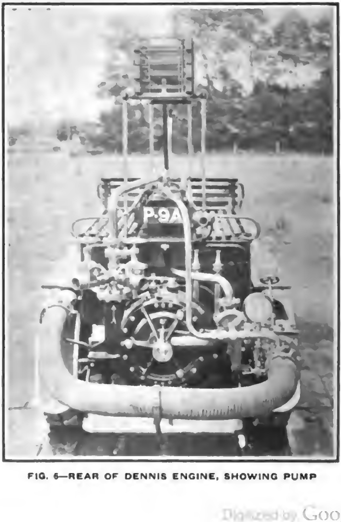


FIG. 6—REAR OF DENNIS ENGINE, SHOWING PUMP

MANAGEMENT OF ELECTRIC VEHICLE BATTERIES*

Practical Suggestions and Instructions for Those Who Have Charge of the Operation and Upkeep of Lead Storage Batteries—Battery Components—Charging and Discharging—Ampere Hour Meter

H. M. BECK

WITH the rapid increase in the number of electric vehicles, the question of the proper operation and care of the storage battery becomes one of increased importance, as the best vehicle will not run if the battery goes wrong. While under normal conditions, the care of a battery is a comparatively simple matter, it must not on this account be entirely overlooked, and unfortunately, there has been some tendency recently, to minimize the actual attention required. This policy is not new, having been tried in other lines of battery work, and if continued, is sure to result disastrously. Why not rather admit that a certain amount of attention is required and insist on it? The best battery can be ruined in a comparatively few charges or discharges, where it would have given a long life with proper treatment.

The instruction books furnished by the manufacturers go into the operation and care of vehicle batteries very completely, and as they have been revised from time to time, one of them now being in its sixteenth edition, they are up to date. It will not be necessary, therefore, to go into many of the details of operation, but there are certain points which are either frequently misunderstood, or else on which it would be well to lay special emphasis, as their importance has apparently not been appreciated.

CHEMICAL NATURE OF BATTERY

A storage battery is chemical in its nature, rather than mechanical, and must not, therefore, be confused with mechanical apparatus. The latter give much more marked warning when it requires attention, and the fact that a battery may be apparently operating perfectly when it requires attention, is responsible for a great deal of battery trouble. When a battery finally breaks down, permanent injury has been done, and while it can generally be doctored back into shape, it cannot be made to give the life it should have given. In probably no line of technical work is prevention rather than cure of so vital importance.

Unfortunately the chemical theory of the storage battery has never been definitely settled, but an approximate idea of what goes on during charge and discharge can be easily stated.

A storage battery from an elementary standpoint, consists of two or more plates, positive and negative, insulated from each other and submerged in a jar of dilute sulphuric acid. The plates consist of finely divided lead known as the active material held in grids which serve both as supports and as conductors for the active material. The active material being finely divided, offers an enormous surface to the electrolyte and thus electrochemical action can take place easily and quickly. Two plates such as described, would have no potential difference, the active material of each being the same. If, however, current from an outside source is passed between them, one, the positive, will become oxidized, while the other remains as before, pure lead. This combination will be found to have a potential difference of about two volts, and if connected through an external circuit, current will flow. During discharge the oxidized plate loses its oxygen and both plates will become sulphated until, if the discharge is carried far enough, both plates will again become chemically alike, the active material consisting of lead sulphate. On again charging, the sulphate is driven out of both plates and the positive plate oxidized and this cycle can be repeated as often as desired until the plates are worn out. Thus charging and discharging simply results in a chemical change in the active material and electrolyte, and the potential difference between the plates and capacity is due to this change.

POINTS OF IMPORTANCE

In taking care of a storage battery, there are four points which are of the first importance:

1st.—The battery must be charged properly.

2d.—The battery must not be overdischarged.

3d.—Short circuits between the plates or from sediment under them, must be prevented.

4th.—The plates must be kept covered with electrolyte and only water of the proper purity used for replacing evaporation.

While, as already stated, it is impossible to given an accurate formula for the chemical changes which take place in a storage battery during the charge and discharge, certain facts dependent upon these are well established and are used as a basis for operation. These are the following:

Voltage—During charge the voltage of a battery gradually increases until the cells are fully charged, but it will then come to a standstill and will not rise any higher, no matter how long the charge is continued. The maximum voltage thus reached is not a fixed point, varying widely at different times, depending upon the age of the battery, the temperature, the strength of the electrolyte and the charging rate.

During discharge the voltage falls, and if the discharge were carried far enough, it would reach zero, but experience has shown that this point is much too low for safety, resulting in the rapid destruction of the plates.

Specific Gravity—Due to the fact that during discharge the active material of both plates becomes sulphated, the specific gravity of the electrolyte falls. During charge the reverse process goes on, the sulphate is driven out, and the specific gravity of the electrolyte rises. As with the voltage, the gravity will rise gradually during charge until all the sulphate is driven out of the plates, but will then show no further increase, no matter how long the charge is continued. The maximum gravity thus obtained is also a variable figure, depending upon the temperature of the electrolyte as well as upon the actual amount of acid and water present in the cell.

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*From a paper read at the summer meeting of the Society of Automobile Engineers in Chicago.

The fall in gravity is almost proportional to the ampere hours discharge. In other words, specific gravity readings can be used as an ampere hour meter, but, unfortunately, gravity readings are difficult or disagreeablee to obtain in the case of vehicle batteries, so that this check on the discharge is not frequently used.

GASSING OF BATTERY

Gassing: Until nearly charged, the plates in a storage battery should absorb the energy put into them with little or no gassing. When they are nearly charged, the energy, instead of being stored, shows itself in the form of more or less gassing, the amount depending upon the rate of charge. During discharge a cell should never gas. If it does so, it is an indication that it has been run down much too low and needs immediate attention.

Of the foregoing indications, the first two, voltage and gravity are those most commonly employed in operating. Gassing, while of great assistance as a guide or warning, cannot be depended upon for accurate results, and is only used when nothing but the most crude methods of operation are practical.

Either voltage or gravity readings alone could be used, but as both have advantages in certain cases, and disadvantages in others, it is advisablee to use each for the purpose for which it is best fitted, the one serving as a check on the other.

Voltage has the great disadvantage in that it is dependent upon the rate of current flowing. Open circuit readings are of no value, as a cell reads almost the same discharged as it does charged. On the other hand, a voltmeter is a very easy instrument to read and may be located wherever desirable.

Specific gravity readings are almost independent of the current flowing, but the hydrometer is difficult to read, not very sensitive, and the readings must be taken directly at the cells.

MANNER OF CHARGING

Charge: In the case of the pasted type of plates used almost entirely in vehicle service, experience has shown that the manner of charging has much to do with the life of the plates, and on this account it is sometimes stated that the life of a vehicle cell is proportioned to the number of charges, rather than the number of discharges. On this account it is wise to charge the cells as moderately as practical. On the other hand, it has been found that if the plates are to be kept in good condition, it is necessary to occasionally charge them to a maximum, thus reducing all the sulphate. Also, the different cells of a battery work as independent units, and while their efficiencies are approximately the same, there is generally some slight variation, which, if the cells are charged on a very efficient basis, will, sooner or later, cause irregularity, the cells with the lowest efficiency dropping behind. It is necessary, therefore, occasionally to even them up, or the low cells will get in trouble. To meet these conditions, charges are divided into two classes—regular charges which should be as efficient as possible, and overcharges given at stated intervals, which are carried to a maximum voltage and gravity, and intended to reduce all the sulphate in plates and even up any irregularity in the cells.

Initial Charge: New batteries are usually received in a charged condition, but when this is not the case, the plates, being shipped dry, or where the battery has been taken out of commission, it requires an initial charge before it is ready for service. This charge is not a complicated matter, but requires considerable time, frequently over 100 hours, and there is a very general tendency to cut it short. When the initial charge is not complete, the plates will not be properly formed, a certain amount of sulphate will remain in them, which will produce local action and the capacity and life of the cells will be materially reduced.

In regular operation it is well to charge at the lowest possible rate. A large part of the wear on the plates is caused by the gassing, and the amount of gassing is reduced by a lower rate of current. Since the gassing occurs almost entirely near the end of the charge, it is especially important that the charging rate be low at this point, so that when the available time is limited, the necessary number of ampere hours can be gotten into the battery with the least possible wear by having the current rate high at the beginning of the charge and low at the end.

FINAL VOLTAGE VARIABLE

There is one point in connection with the charge which should be especially emphasized, namely, that the final voltage correspondingto a full charge is not a fixed figure, but varies widely, depending upon the charging rate, the temperature, the strength of the electrolyte, and age of the battery. For this reason, charging to a fixed voltage is unreliable and likely to result disastrously. The charge should be continued until the voltage or gravity cease rising, no matter what actual figures are reached. Old cells at high temperatures may not go above 2.4 volts per cell, whereas if very cold, they have been known to run up to three volts.

The points to be especially emphasized in connection with the charge are:

First—On regular charges keep the rates as low as practical and cut off the current promptly. If is preferable to cut off a little too soon rather than to run too long where there is any question.

Second—Overcharges must be given at stated intervals and continued to a complete maximum. They should be cut off at the proper point, but, when in doubt, it is safer to run too long, rather than to cut off too soon.

Third—Do not limit the charge by fixed voltage.

Fourth—Keep the temperature within safe limits.

Discharge: The discharge largely takes care of itself, except that a battery should not be run down below its voltage limit. The rate of current has very little effect upon the life of the plates, provided the discharge is not carried down too far. Where a battery is completely discharged, it should be charged as soon as possible, and if it has been run down too low, the charge should be continued to a maximum similar to the overcharge.

Ampere Hour Meter: Many attempts have been made to develop apparatus which would automatically show the charge and discharge of a storage battery, but these have either been based on the wrong principles, or else the instruments would not stand the wear and tear to which they were subjected, and they have therefore not proved satisfactory. Within the last year or so, however, a mercury type ampere hour meter has been placed on the market, designed especially for battery use, and so far the results obtained have been very promising. This meter is equipped with a large dial and a pointer which can be set by hand to any point desired. This pointer revolves in one direction during charge and in the opposite direction during discharge, and registers directly the ampere hour output or input to the battery. The mercury in which the armature disk is submerged acts as a dash-pot, and seems to be very effective in damping the vibrations and jolts which such a meter has to stand.

READING DISCHARGE BY METER

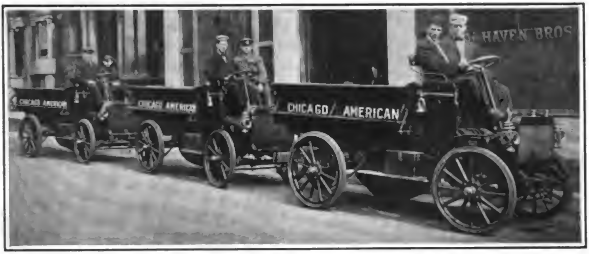
During discharge the meter shows directly what capacity has been taken out, so that it is a simple matter to determine what is left in the battery. For charging the procedure is somewhat more complicated, although not seriously so. It is necessary to charge a battery for from fifteen to twenty per cent. more ampere hours than are discharged in order to make up for the losses in the battery. The method used to accomplish this is to move the pointer ahead the proper number of ampere hours just before charging, then charge until the pointer comes back to zero. The meters are equipped with an electrical contact at the zero point, which can be made to automatically open the circuit if desired. As will be seen, this considerably simplifies the handling of the charge, but there is one point which must not be overlooked, and which should be strongly emphasized, namely, that the efficiency of a battery varies with the amount of work it does, being much lower for light work than heavy. In fact, as long as in commission, the battery needs regular charges, even if it does no work at all; in other words, its efficiency would then be zero. This condition can be handled in several ways. Under average conditions, it is probably safe to charge by the ampere hour meter for a set period, say, two weeks, provided at the end of this period the battery is given a regular overcharge. An alternative method is to give an additional charge once a week by the meter of whatever number of ampere hours is found necessary to keep the battery up. The regular bi-weekly overcharge will probably be found to be the safer method, especially in private service where the conditions are so variable, but whatever method is used, too much emphasis cannot be laid upon the fact that if a battery is to be kept in good condition, in addition to the ordinary charges with the ampere hour meter, regular overcharges must be given. The meter certainly gives promise of reducing the amount of attention a battery requires, but the danger is that it will therefore be assumed that it will eliminate all of it.

(To be continued.)

NEWSPAPER DELIVERY BY TRUCK

An average of 100 miles a day is covered by each of the three Randolph delivery wagons now running in the service of the *Chicago American*, and most of this mileage is crowded into a comparatively few hours in the day.

The rated capacity of each of the three machines is 1,500 pounds, and despite the fact that they are equipped with solid tires, they are driven at as high a rate as 25 to 30 miles an hour. Up to the present they have done excellent service and the publishers are well pleased with the efficiency and economy shown by the cars.



RANDOLPH GAS-MOTOR WAGONS USED BY CHICAGO AMERICAN FOR NEWSPAPER DELIVERY

Following is the approximate daily cost of operation and maintenance, as learned by Leo Arnstein, eastern manager of the New York office of the Randolph Motor Car Co.:

Driver, $2.50; gasoline, $1.25; oil, $0.35; supplies, $0.15; garage, $0.50; tires, $0.45. Total, per day, $5.20.

London Punch recently suggested some necessary revisions in Johnson's Dictionary, which included: "Highway—A track maintained at the public charges for the use of mechanically propelled vehicles. A track for the use of all (obsolete)."

Many of the railroads throughout the country are abandoning the hand car, which has been a familiar part of the equipment of the section gang charged with the maintenance of the roadbed. In place of the manually operated car, gasoline motor vehicles are being employed. It is found that by the use of these machines a gang can cover a greater extent of teritory than was the case when the old method of propulsion was in use.

ORGANIZATION OF COMMERCIAL VEHICLE USERS

Advantages to Be Gained From Co-operation Illustrated by Activities of the Commercial Motor Users' Association in England

"IN union there is strength" is an adage that is as applicable to the users of industrial motor vehicles as to owners of pleasure cars. Many obvious advantages can be gained by the individual user of motor trucks or delivery wagons by a combination of his interests with those of a large number of other similar users which could not be secured, except at heavy financial outlay and the devotion of too much time and attention to the object, by one owner acting single handed. This fact is, of course, well recognized by the owners of touring cars and runabouts, who combine their strength by the organization of local clubs and national organizations, and also by the pleasure car manufacturers, who have their national associations for the promotion of shows, the conduct of touring competitions, opposition to unjust laws and the improvement of wagon roads.

The time seems ripe for the private users of motor trucks and delivery wagons to organize active bodies to look after the particular interests of their large and rapidly growing numbers. Manufacturers, on their part, need the stimulating influence of well-managed exhibitions and competitions that shall awaken the general public to the importance of the transportation of goods by self-propelled road vehicles and the state of development to which this branch of the motor car industry has been brought in America; and the private user, on his part, has much to gain in the way of street improvement, demonstrations of the efficiency and economy of the commercial vehicle, inspection of the various makes of machines side by side at shows, resistance to discriminative laws and unjust prosecution, and in numerous other ways.

In a matter of this sort it is always useful to have a precedent to work upon, so it will be of interest to consider the organization and success of the Commercial Motor Users' Association founded four and a half years ago in England and which now has a membership of about 350, with headquarters at No. 1 Albemarle street, London, W. Any firm may become a member of the Association upon payment of the annual subscription price of $5.25, which includes a subscription to the Association's official organ, the *Commercial Motor*, published weekly, and of which sum $2.62 is paid into the treasury of the Motor Union in return for office accommodation, clerical assistance, legal defense and copies of the Motor Union *Journal and Gazette*.

The objects of the Commercial Motor Users' Association may be summed up as follows:

(*a*) To resist undue restrictions being placed on these vehicles by authorities having jurisdiction over roads, bridges, and traffic.

(*b*) To consider any claim from members for financial or legal assistance in respect to actions at law, either civil or criminal, in connection with the use of these vehicles, and, if deemed expedient by the Executive Committee, to render assistance.

(*c*) To give information or advice, and generally to protect and extend the rights and privileges of users of these vehicles.

(*d*) To originate, and from time to time promote, improvements in laws and regulations directly or indirectly affecting self-propelled vehicular road traffic, and to support or oppose changes in such laws and regulations.

(*e*) To represent the views of members before Parliament and the government departments.

(*f*) To collect and circulate among the members any information respecting the use of such vehicles likely to be of service to them.

(*g*) To popularize and assist the development of self-propelled vehicular road traffic.

(*h*) To take any action or to do anything that the Executive Committee may consider desirable in the interests of users of these vehicles.

(*i*) To furnish each member, if thought desirable, with a copy or copies of any periodical or periodicals dealing with matters of interest to the Association.

(*j*) To keep a register of drivers for the purpose of employment.

The advantages of membership include the general support of the Motor Union, an organization of motor car owners having for its purposes the protection of its members against illegal bridge tolls and excessive charges for conveyance of motor vehicles by rail, negotiating with local authorities for the improvement of the roads and removal of dangerous corners, opposing bills introduced into Parliament and local by-laws embodying restrictive clauses pertaining to the use of mechanically propelled road vehicles, and, in short, undertaking that work on behalf of users of motor cars which can be discharged only by a strong, united body representative of a majority of all users of such vehicles in the country.

The chairman who directs the activities of the Commercial Motor Users' Association is Col. R. E. B. Crompton, C. B., who first distinguished himself in the commercial vehicle field in the early 70's, when for several years he ran three-wheeled rubber-tired traction engines in the post office service in India, and later on came into prominence in connection with the steam trucks used by the English army in the South African war. Mr. E. Shrapnell-Smith, treasurer of the organization, was identified previously to 1905 for a number of years with numerous trials and demonstrations that tended to extend the use of the commercial vehicle in Great Britain. The secretary is Mr. Rees-Jeffries, well known in English motoring circles.

Some useful and interesting results have been accomplished by the Association in addition to the general effect its activities have had toward popularizing the use of industrial motor vehicles, and in particular the motor omnibus and motor cab, which have become familiar sights in the streets not only of London, but of other English cities as well. There are already indications that the number of commercial motor vehicles will soon outnumber those used for touring and pleasure. The Association co-operated with the Royal Automobile Club in conducting the commercial motor vehicle trials in England that have proved so successful during the last two years, and has held two meets at which prizes were offered to encourage the drivers of heavy industrial vehicles to keep their machines in the best possible condition, to run them without accident and to devote to their work all possible skill and care.

Other schemes put forward and carried out with success were the awarding of a prize to the vehicle which showed fredom from the dripping of oil during the heavy vehicle trials, the investigation and facilitating of loading arrangements for commercial cars at docks and quays, the organization of a course of instructive lectures before eight different Chambers of Commerce and many other plans helpful to the real utilities of the self-propelled business wagon.

A considerable amount of time and attention has been devoted to the matter of bridges and claims arising with regard to them. In a number of cases where damages have been claimed by members on account of defective bridges, blank forms of questions issued to the members by the executive committee have been filled out, and upon the information thus furnished legal advice has been given that has been of great assistance to the members. Considerable information and advice has also been given to members in connection with restrictions made by authorities and owners of bridges over canals and over other water courses. The Association was successful in opposing the efforts of the owners to restrict a large number of bridges in Cambridgeshire to heavy motor vehicles weighing less than two tons. As a result, five or six bridges had been strengthened and the prohibitive notices removed by the end of 1908, and in time all will be similarly improved.

By co-operation with the legal department of the Motor Union the Association has been able to give considerable information and advice of a legal nature to its members in a large number of cases, and also to contribute financially in the defense of members prosecuted for the emission of smoke by their vehicles, for the operation of vehicles claimed to be public nuisances because of the vibration and noise in operation, and so on.

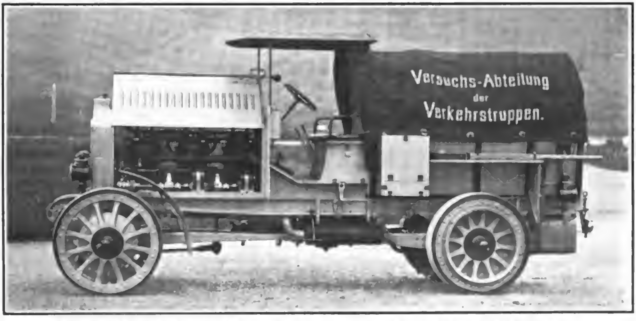
Financially, the Commercial Motor Users' Association is in a healthy condition. During 1907, which is the latest year for which the committee's report is available, the income amounted to $1,354.50 and the expenditures to $1,164.81. This left a balance of $189.69, which, added to the sum of $908.43 carried over from 1906, made a total balance at the end of 1907 of $1,098.12, out of which $262.50 was voted to the secretary for his services during the year.

DAIMLER MILITARY MOTOR WAGON

The accompanying illustration represents a powerful motor vehicle built expressly for the service of the German army in wartime by the famous Daimler Works. This machine, besides carrying a considerable load on its own platform, is intended to serve as a tractor for army supply and ammunition road trains. The trailer coupling at the rear end of the machine is clearly shown in the engraving.

The propulsive power is supplied by a large six-cylinder internal combustion engine which drives to all four wheels. The object of this arrangement is to use the full weight of the machine to secure tractive adherence under the worst conditions that may be expected in wartime. Iron tires are used to make the machine as independent as possible of outside help. All the apparatus that may be required to pull the machine or its trailers out of difficulty is carried outside of the body or in specially disposed cases. The whole machine is remarkably impressive as a well-worked out design for a specific purpose, though the complication of the motor and transmission system would certainly necessitate the most expert operation.

Asphalt gives a good wearing surface for city streets. It is clean, healthful and durable. The only serious objection to it is slipperiness when the surface is moistened. Rock asphalt laid in the form of powder on a concrete foundation and compressed, with heated irons and rolling, into a homogeneous mass, making a layer 2 1-4 inches thick, will last 15 years under heavy metropolitan traffic, said a British authority at a recent road conference in London.



FOUR-WHEEL DRIVE MILITARY WAGON BUILT BY DAIMLER WORKS FOR GERMAN ARMY

EWING TAXICAB, BUILT IN GENEVA, OHIO

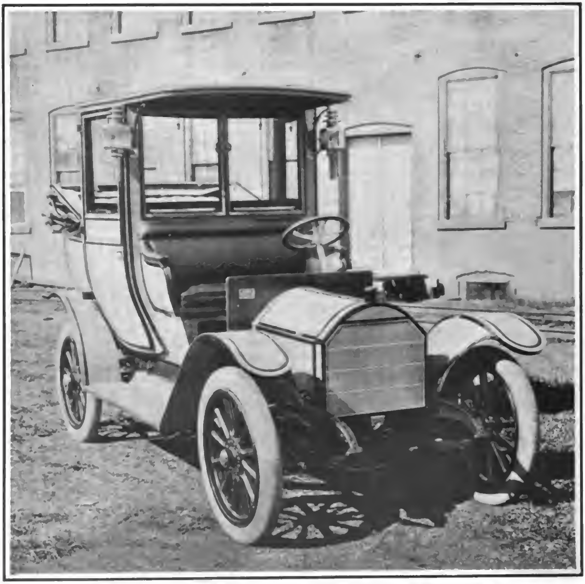
ONE of the most attractive looking taxicabs in the American market is without doubt the Ewing, designed by L. P. Mooers, for years the designer for the Peerless Motor Car Co., and manufactured by the Ewing Automobile Co., having a factory at Geneva, Ohio, and general offices in Cleveland.

The Ewing is a real taxicab, designed especially with regard to the severe character of the work that a public motor cab is called upon to do, and built from suitable materials and with the most careful workmanship. Something of the character of the work can be gathered from an examination of the illustration herewith and consideration of the description.

The frame, which is of pressed steel 5-32-inch thick by 4 1-2 inches deep, is 28 inches wide in front and 34 inches wide in the rear portion, which is raised 5 inches above the front level to give ample room for rise and fall of the body. The side bend is long and is reinforced by widening the channel members on top and bottom of the side frames, thus making the bend safe without applied reinforcing. The whole chassis frame is very heavy and strong, with ample width of cross members, substantial gussets and long diagonal braces in the rear.

The front axle is an I-section steel drop-forging, one piece, no weld. The stub axles are large, and the stub-axle yoke pins are 7-8 inch diameter, of steel, hardened and ground, which work in hardened and ground-steel bushings forced into the stub-axle eyes, the pins being held stationary in the axle-yoke eyes. The yoke opening is 4 inches, giving the stub axle ample support.

The gear housing and rear axle casing is made of two very strong malleable iron castings, everywhere full circle form, faced and rabbeted together in the middle and held with eight steel bolts, making a housing strongest in the middle, which needs no truss and has nothing to go adrift and cause a breakdown. The rear wheels are carried on the outer ends of steel tube sleeves, finished and slipped into these housing members, instead of



FRONT VIEW OF THE EWING TAXICAB FITTED WITH LEFT SIDE CONTROL being keyed to the live axle ends, thus giving the rear wheels the best possible support and relieving the live axles from all work save that of turning the wheels.

The live axles are open-hearth steel forgings, squared at the inside end to slip into the squared eye of the balance gear hub and having the wheel-hub driving-clutch plate forged integral at the live axle outer end, so that the axles can be withdrawn without disturbing anything else, after the hub caps are removed. The live axles are 1 1-4 inches diameter, heat treated and of more than usual strength.

Front springs are half elliptics, 36 inches long by 2 inches wire, 7 leaves. The rear springs are three-quarter elliptics; the lower member is 42 inches long, 2 inches wide, 8 leaves. The top one-quarter member has a scroll-end and is linked to the lower member. The lower member is revolubly perched on the rear axle and is linked to the chassis frame side in front. This spring linking leaves the whole rear axle-casing assembly free within limits fore and aft, so that the propeller shaft imposes the least possible stress on the entire rear spring and propulsion assembly. This construction avoids all needless parts, all adjustments, all conflicting radiuses of motion and leaves each part free to follow road-level variations with least detrimental effect on the driving parts, the springs and the chassis frame.

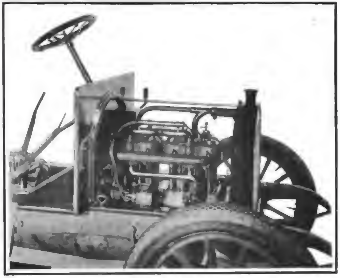
All four wheels have twelve spokes, 1 3-4 inches wide, as the front wheels work a large part of the time at wide angles (the cab can turn in a circle of 25 feet diameter) and need to be fully as strong as the rear wheels, which work always in a straight line with relation to the chassis frame. All the wheels run on adjustable two-point ball bearings 1-2 and 3-4 inch diameter on both front and rear axles. The bearings resist side thrusts and can be readily adjusted to prevent side play, which is destructive to cups and cones.

The motor has four cylinders of 3 7-8 inches bore and 4 1-4 inches stroke, cast in pairs with integral water jackets, having a large opening at the top to permit inspection and cleaning of the water cavity. This opening is closed by a cap. The cylinders are finished by boring and reaming, while the pistons are finished by grinding. Each piston has four compression rings above the wrist-pin. The pistons are a straight taper in form, 5-1000ths of an inch small at the bottom open-end and 10-1000ths small at the top, giving free room for oil and depending on the rings for packing, thus avoiding all danger of the pistons sticking in the cylinders.

Bearings and wrists are formed integral with the crankshaft and are all of 1 5-8 inch diameter. The whole shaft is finished by grinding and has three journals and is flanged at the rear end to take the vaned flywheel. No other fan is fitted.

All valves are on one side and are all alike. The seats are integral with the cylinders, all parts 1-11-16-inch diameter. The camshaft and cams are integral, with cams ground to be perfectly interchangeable. The lifters are disks on stems, the disks hardened and riding the cams, which avoids cam rollers, with their well-known troubles, and all valve-action adjustments.

Below the engine crank-pits is an oil reservoir, from which the oil is sucked by a force pump that delivers it to the three crankshaft journals through oil leads of 1-4 inch unobstructed diameter. Oil from the journals goes to supply the two crank pits which overflow to the oil reservoir below. The crank-arms and crank-wrists are drilled with 3-16-inch holes and have oil catchers to carry oil from the main journals through the wrist and rod bearings. The rod-caps are also driller with oil pick-up holes to take splash-pool oil. The force-pump oil line is fitted with an oil cock which can be opened by the driver, who knows that the lubricating oil is circulating and oiling the motor properly if this cock shows oil when opened.



MOTOR COMPARTMENT OF EWING CAB

Ignition is by single jump-spark, with high-tension magneto.

The radiator is supported on two trunnions at the bottom and has a stay-rod, not used for the hod-flap hinge, on top, thus avoiding radiator strain by chassis frame flexure. Circulation is by a centrifugal pump, magneto shaft coupled to the pump shaft.

The clutch has multiple disks enclosed in an oil-tight chamber applied to the fly-wheel, so that the clutch disks and casing can be readily removed in integral assembly without disturbing anything else.

The change-speed gear is selective, three forward speeds and a reverse, with universal joint between the clutch hub and the line shaft. The gear-shift lever quadrant is in the middle, and is bolted directly to the aluminum gear box, which has a large cap, fully exposing the interior when removed. All the gears are Midvale chrome nickel steel, oil-tempered, 6-8 gear tooth, gear faces 7-8 and 1 inch.

There are two limited-range universal joints between the gear-box line shaft and the propeller shaft, the rear joint being concentric with the globe shell of the propeller shaft sleeve. This propeller shaft sleeve forms, with its braces and the rear axle assembly, a triangular structure which permits the rear wheels to follow broad surface variations freely and transmits the driving wheel effort with absolute freedom to a large globe-joint at the center of a strong cross-member of the chassis frame just back of the gear-box. This construction gives a perfectly free drive and unhampered spring action with the least liability of giving trouble.

Both gear-box and motor are supported at one point in the middle in front and at two points in the rear, giving a true three-point suspension.

The balance or differential gear is of the bevel four-pinion type. The hubs are on two-point ball bearings, adjustable. The bevel driving gear and the propeller-shaft pinions are of hardened steel and of ample size and strength. The propeller shaft, 1 5-16 diameter, is carried in a heavy steel tube sleeve, 2 1-4 inches outside diameter, and turns on New Departure double ball bearings at both ends.

Rear hub-brake drums, 12 inches inside diameter by 2 inches face, are fitted with two-ounce half-shoes having segmental bearings on the pin at one end and flat faces for cam rocker expanding at the other end, the two shoe members being normally collapsed by two coiled springs. The brake friction contact between pressed steel and 9 parts copper, 1 part tin bronze, is worked without lubrication, this particular composition giving ample friction without scratching or cutting. No external bands are fitted to these emergency rear-hub brake-drums.

The ordinary brake-drum is placed on the line-shaft close in the rear of the gear box. It is a gray iron casting, 10 inches diameter by 3 inches face, surrounded by a ring of the same bronze and applied by a rocker carrying two-face or spiral cams. The emergency brake equalization is by a loop of wire cable and hollow rock shaft. The ordinary brake is pedal applied.

The steering wheel is placed on the left, where it enables the driver to see how much room he has when passing vehicles going in the opposite direction. The steering action is a worm and sector, no adjustment.

The carbureter is on the left side of the motor and the throttle is controlled by the single ratchet-retained hand lever on top of the steering wheel.

The emergency brake lever, latched, is placed with the gear-shift lever in the middle of the foot-board. The gear-shift lever has the usual five positions, one neutral, in two slots. No two gears can be engaged at the same time and a spring catch prevents unintentional reversing.

The clutch is applied by a ball-shaped pusher, linked at the ends to two short arms on the clutch rocker and having two screw studs which pull a thrust ball-bearing collar to the rear to disengage the multiple disk clutch, normally engaged by the thrust of a coiled spring.

The toe-board carries a small accelerating lever, moved sidewise by the foot to open the throttle and returned by a spring to hand-lever control position when foot pressure is released.

Of the two large pedals on the foot board, that at the left disengages the clutch while that at the right is free on the clutch rocker and is pushed forward to apply the service brake on the line shaft. The entire control is of the simplest form, can be learned in a few minutes and cannot be misapplied in any way.

TAXIMETERS NOT MADE TO CHEAT

Editor THE COMMERCIAL VEHICLE:

Sir: Without intending intentionally to injure a business which has grown to be a public necessity and in which many hundreds of thousands of dollars have been invested, several of the leading newspapers of New York have been induced to assume an attitude regarding the taxicab service which would not have been assumed if conditions had been investigated as they relate to the investment in the city of New York. Without going into any criticism of the source or purpose of this stand, a plain statement of the facts at this time seems pertinent.

The taximeter—a device intended to make a visible record of the distance traveled by a passenger in a horse-drawn or a motor vehicle—was invented by Popp, of Paris, and has been in successful operation in the city of Berlin for the last eighteen years. It has given general satisfaction to the public there. Its introduction in New York was welcomed by that part of the community that was pleased to employ a method of transportation accounting in preference to the uncertain and widely varying method of the old-fashioned hack, where the charge for service depended largely on the ingenuity of the man in charge of the vehicle and against whose dictum there was no appeal except in a police station.

The taxicab was intended to do away with this abuse and annoyance, and it was so effective that opposition on the part of the old-time hackmen was begun largely through political channels, and the newspapers were deceived into the belief that they were advocating a popular protest by denouncing the taximeter as a fraud. It has been alleged, but must be an absurdity to any mechanician, that a chauffeur is able, when he so chooses, to disarrange the mechanism of the clock so it will record a charge to the disadvantage of the passenger and show a charge that could not be other than fraudulent.

It seems almost needless to give this serious consideration. It is inconceivable that any taximeter cab company could enter into an agreement to defraud that would demand the collusion of the employees in its machine shop, the treasurer, or other responsible official of the company, and the chauffeur who operated the cab Such trickery could not last twenty-four hours without betrayal or discovery, so that it may be dismissed as unworthy of discussion.

Reduce the responsibility for cheating to one man—the chauffeur—and see how improbable that condition would be. The taximeter is intended for the protection of the cab company as well as the passenger. When a chauffeur starts out on his day's work the clock is sealed, that is to say, the flexible shaft which carries the record of the revolution of the wheels to the clock and makes record of the money charge at the rate prescribed by the municipal ordinance is protected by leaden or brass seals at the wheel shaft and at the clock connection. To shut off the registration it would be necessary for the chauffeur to carry a duplicate set of seals and adjust them surreptitiously and then find a customer dishonest enough to pay a cut rate which the thieving chauffeur would appropriate to his own use. At the end of the day the chauffeur would be obliged to explain, because the register would show the pay miles and the dead miles.

The second proposition is almost as untenable as the first, but it is nearer the line of probability. The collusion in that case would be between the "beat" and the chauffeur, with the chances of the "beat" increasing his demands for accommodation until he was riding for nothing.

As to the rates charged, a simple mathematical calculation will show that a rate of 30 cents for the first half mile and 10 cents for each additional quarter mile cannot be maintained except at a loss, and that 40 cents for the initial half mile will not pay dividends. It is out of

all reason to compare the rates in New York with those in Paris, Berlin or Vienna. The conditions both as to the rate of wages paid and the paving of the streets are entirely different. It would be just as logical to assert that as a six or seven-room house can be rented in England for $300 a year or less, the same rental should prevail in New York. JOHN H. NAUGHTON,
Treasurer, Universal Taximeter Cab Co.

TAXICAB NOTES OF INTEREST

Taxicabs are to be manufactured and operated in Memphis, Tenn., by the Corbitt Taxicab Co., which has been organized and will build cabs of conventional type in a new factory that is to employ about 200 men.

A number of Columbus, Ohio, men are promoting a taxicab line for the Buckeye capital. The promoters will soon incorporate with sufficient capital to install a service to cover the entire city. It is the intention to place the cabs in service some time during the fall.

New quarters at Seventh avenue and Forty-ninth street, New York City, are now occupied by the Franco-American Taxicab Co., which has taken full charge of its taximeter business, formerly in the hands of Lavalette & Co. as rental agents. The new building has a garage and repair shop of sufficient size to satisfactorily take care of the increasing business. The company has branches for the handling of its taximeters in Boston, Washington, Chicago, New Orleans and San Francisco.

The Kayton Taxicar & Garage Company, of New York, which has been using Atlas two-cycle taxicabs for the past year, has recently placed another order for forty additional cabs with the Atlas Motor Car Company, of Springfield, Mass. After trying various makes of cabs, the Kayton company has adopted the Atlas exclusively. If the order for forty is completed by October 15, it will be followed by a similar order, making more than one hundred cabs of this make in use by the Kayton concern.

AMERICAN TRUCKS FOR SOUTH AFRICA

By all odds the largest contract ever given for motor trucks in this country is the one secured by the R. L. Morgan Co., of Worcester, Mass., from the American-South African Commerce Co., of Johannesburg, South Africa, for 100 trucks.

The trucks are to be used for hauling ore from the company's mining properties and for hauling supplies and machinery and all kinds of goods for commercial purposes. It is said by members of the Morgan company that the order, which aggregates $350,000, may be increased before it is completed, as there is a likelihood of the South African company using many more than 100 trucks in its great mining and development business.

The contract was made after a representative of the company—Gen. Samuel Pearson, who purchased the Krupp guns for the Boer army in the late war with England—had visited Worcester and seen the Morgan truck demonstrated.

Ralph L. Morgan, designer of the truck, and his associates are especially elated over their success in securing this contract because it was made only after General Pearson had examined numerous makes of trucks in Europe and America, and at a time when Mr. Morgan had not even incorporated a company or secured a factory for the manufacture of the trucks.

MORGAN TRUCK CARRYING LOAD OF LATHS

Following the incorporation of the R. L. Morgan Co., Lewis M. Crittsinger, formerly with the Chalmers-Detroit motor car plant, was made purchasing agent for the company in July and the cost and production work was taken in hand by F. W. Jacques, formerly with the Pierce-Arrow Co. in Buffalo. Work on the first lot of trucks is progressing rapidly. Several months will be required for filling the order. Members of the company say that they have assurances that the original order will be increased as soon as the first machines received are giving satisfactory service in South Africa, where they are to be used on 25-mile routes formerly covered by cattle and mules, which have been dying off by thousands from a new cattle disease.

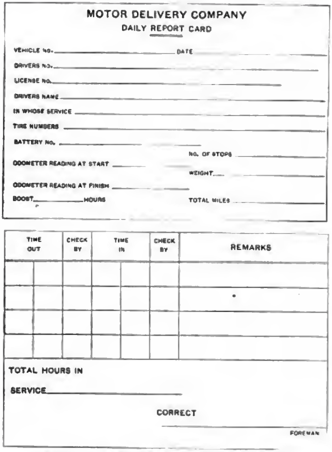
MOTOR VEHICLE CONTRACT SERVICE

The award of the big mail transfer contract for New York City to the Motor Delivery Company, the details of which were given in THE COMMERCIAL VEHICLE for July, 1909, served to call attention to the nature of the business in which this company is regularly engaged.

The company leases electric commercial vehicles for the delivery work of business firms in Manhattan. It was incorporated in February last, but Charles H. Bardwell, president and general manager, has been at work on the enterprise for two years.

The business is conducted on the same general plan as that of the H. C. & A. I. Piercy Company, on West Fifteenth street, described in the June issue of this paper. The Motor Delivery Company contracts with its patrons to furnish a certain number of vehicles, with drivers, to do their work for a year, and paints the name of each lessee on the machines assigned to his work so that they are to all intents private wagons. The motor company's name does not appear, although it takes all the care of and responsibility for the vehicles. It is now operating in this way eight General Vehicle Company wagons which do the delivery work for five concerns. They are maintained in the commercial vehicle garage of the New York Transportation Company, at 141 East Twenty-fifth street, known as the Lexington Building, where the delivery company also has an office. Nine hours' service is given each working day, not including one hour in the middle of the day for lunch; that is, it is a ten-hour day for machine and driver, with one hour lay-off at noon.

For this service the following scale of rates is charged



MOTOR DELIVERY COMPANY
DAILY REPORT CARD

VEHICLE NO. ____ DATE ____
DRIVERS NO. ____
LICENSE NO. ____
DRIVERS NAME ____
IN WHOSE SERVICE ____
TIRE NUMBERS ____
BATTERY NO. ____
NO. OF STOPS ____
ODOMETER READING AT START ____
WEIGHT ____
ODOMETER READING AT FINISH ____
BOOST ____ HOURS
TOTAL MILES ____

TIME OUT		CHECK BY	TIME IN		CHECK BY	REMARKS

TOTAL HOURS IN SERVICE ____

CORRECT ____
FOREMAN

FRONT AND REVERSE OF VEHICLE REPORT

on an annual contract: For a 1,000-pound wagon, with driver, $10 a day, or $60 a week; for a 2,000-pound wagon, $11 a day; for a 4,000-pound machine, $12 a day; for a 3 1-2 ton truck, $13.50 daily, and for a 5-ton truck, $15 a day or $90 a week.

With the completion of the new garage which the company erected for its post office wagons at 3 and 5 Lawrence street, in Harlem, Manager Bardwell is now in position to look for customers in that section of the city, as the 5,000 feet of floor area affords ample room for the storage of many machines besides those employed in the government work, and there are charging plugs for about two dozen vehicles.

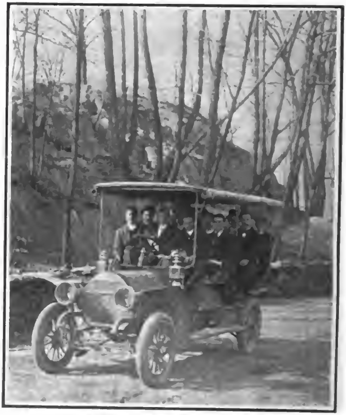
For the preservation of records of performance by vehicles a card system is kept in which are filed daily report cards. One side of the card is ruled with spaces for the entry of times of departure from and return to the garage and total number of hours in service. On the reverse side are spaces to be filled in by the driver and the garage foreman, with other essential or desirable information, as shown in the accompanying reproductions.

ADIRONDACK MOUNTAIN MOTOR STAGE

One of the vehicles operated in a motor stage line in the rough Adirondack country in New York State is shown in the acccompanying engraving of a 35-horse power Locomobile chassis fitted with a 12-passenger body, which is reproduced from a photograph made on one of the mountain roads. The stage line is operated between Forestport and Lake Honnedaga, a distance of 22 miles, by the Adirondack League, an organization which has three club houses on a chain of lakes in that locality. Before the stage line was started the club members were obliged to make a long horseback trip or paddle in canoes from the railroad station at Forestport to their club quarters.

Another vehicle in the service is a regular seven-passenger Locomobile touring car. Both these machines are driven by the League's regular guides, who handle them in a highly efficient manner. Although the roads over which the machines are operated are deeply covered with sand for long stretches it has not been found necessary for the passengers in the big car to "get out and push" in any condition of weather. This larger machine has removable seats so that a large amount of baggage can be carried.

In a paper read before the recent Road Conference in London, Albert D. Greatorex, an English engineer, said that any material used as a binder for road making, or for dust laying, should have the following qualities: (1) Form a perfect waterproof crust. (2) Be as effectual in wet weather as in fine. (3) In dry weather reduce dust to a minimum. (4) Must not be affected by sun, nor break up after frost. (5) Non-slipping for horses and other animals. (6) Prevent skidding of mechanically-propelled vehicles. (7) Afford even rolling contact with wheels of all types and thus materially reduce tractive effort. (8) Be equally suitable for all classes of roads and all types of traffic. (9) Suitable for road making or repairing in wet or fine weather. (10) Must not contain any substance deleterious to paint, rubber or clothing. (11) Must not contain any chemical capable of poisoning fish or animals by admission to watercourses, nor be dangerous to tree-life. (12) Do without addition of any dust-forming material to the surface.



LOCOMOBILE CLUB COACH IN ADIRONDACKS

ENERGY CONSUMPTION OF COMMERCIAL VEHICLES*

ALEXANDER CHURCHWARD

WHEN studying the performance of the motor vehicle, one of the most important items is the energy required per ton mile. We can rely upon the engine to give a certain horse-power output at a predetermined speed. Therefore, knowing the maximum horse-power output of the engine, we can readily determine what service the vehicle is capable of performing.

The horse-power required by a vehicle, however, is influenced by a number of factors, the principal ones being:

1. TIRES

Ordinarily the standard vehicles are equipped with either pneumatic or solid tires—pneumatic on the lighter vehicles, such as runabouts, coupés and broughams; solid tires on some runabouts and cabs, and nearly always on commercial vehicles.

The tractive effort of pneumatic tires on hard level asphalt varies from 15 pounds per ton for special tires designed for electric runabouts up to 35 pounds per ton for the standard type used on gasoline touring cars.

The tractive effort of pneumatic tires is also greatly affected by the air pressure, increasing rapidly as the air pressure is reduced.

The tractive effort of solid tires on hard level asphalt varies from 18 pounds to 26 pounds per ton, depending upon:

(1st) The diameter of driving wheels.

(2d) Revolutions per minute.

(3d) Load in pounds per square inch or pounds per inch width.

(4th) Composition of the compound used.

(5th) Method of attaching tire to wheel rim.

2. CONTROLLING APPARATUS

The efficiency depends a great deal upon the type of drive used, such for instance as:

(1st) The sliding gear with direct drive on the high through a bevel on live rear axle.

(2d) Sliding gear with direct drive on high through countershaft and chains to dead rear axle.

(3d) Sliding gear, not direct on high, and through countershaft and chains to dead rear axle.

(4th) Planetary with direct on high by means of bevel or chain to live rear axle.

(5th) Planetary to countershaft through chains to dead rear axle.

(6th) Friction gear to live rear axle through bevel or chains.

(7th) Friction gear to dead rear axle through chains.

(8th) Worm drive direct on high to live rear axle.

Some form of independent clutch being used on the 1st, 2d, 3d and 8th.

3. TRANSMISSION LOSSES

These include gearing or chain losses, and all bearing losses throughout the vehicle. Most vehicles to-day are built with anti-friction bearings throughout.

Ball bearings should always be used in the countershafts; ball or roller bearings in the wheels. Personally, I prefer ball bearings throughout, and my experience has shown that ball bearings in the wheels are perfectly reliable when properly selected and correctly installed.

From countershaft to wheels the roller chain has proven itself satisfactory, but care must be taken in the selection of the make of chain, also the right pitch and number of teeth in the sprockets.

4. ALIGNMENT OF AXLES AND DRIVING MECHANISM.

Unless the alignment is perfect under all conditions of maximum stress, the energy consumption will be high. An axle sprung beyond the elastic limit by overloading may increase the energy consumption 10 per cent. to 15 per cent.

A vehicle that coasts freely may require too much power when the driving stresses are applied.

Therefore, all parts must be in perfect alignment under all conditions to be met with in service.

5. CORRECT GEAR RATIO

Unless the gear ratio is correct for the average service the vehicle is called on to perform, the motor will either run at too high an average speed or the change speed gears will have to be used very frequently, which will tend to increase the maintenance of the vehicle when placed in the hands of a careless driver.

6. WHEEL DIAMETER

Small wheels will increase the energy consumption materially on the average roadbed, because the smaller the wheel diameter the greater the vehicle vibration when going over an obstacle of a given height.

7. SPRINGS

The springs of a vehicle must be correctly proportioned and of suitable material; otherwise, there will be considerable movement of the vehicle body when going over uneven roads; this, of course, means energy consumed which cannot be restored.

8. ROAD RESISTANCE.

The traffic effort of a vehicle will vary with the road surface as per table, taking the tractive effort of a vehicle on hard level asphalt as unity:

(1) Level asphalt (hard)	1.00
(2) Wood pavement	1.15
(3) Level macadam	1.15 to 3
(4) Plank road	.9
Cobble stones	1.75
(5) Good dirt road	1.10 to 2
(6) Ordinary country road (dirt)	.2
(7) Sand	.20

9. GRADES.

The tractive effort due to grades must be added to the tractive effort for a given road surface.

Example: 5 per cent. grade on hard level asphalt.

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*A paper read at the summer meeting of the Society of Automobile Engineers in Chicago.

Hard level asphalt 25 pounds per ton. 5 per cent. grade = 100 pounds per ton, due to grade alone. 100 + 25 = total tractive effort = 125 pounds per ton.

10. WIND RESISTANCE

Below 12 miles per hour, the additional tractive effort necessary to overcome the wind resistance on heavy vehicles is comparatively small.

But on the light high-speed vehicles, when running at speeds above 12 miles per hour, the wind resistance becomes quite a large factor.

11. ECONOMIC SPEED.

Taking everything into consideration—that is to say, life of engine, transmission, tires and maintenance of vehicle as a whole—experience shows that the following table is approximately correct:

Gross Weight.	Type of Tires.	Speed in M. P. M.
1500 lbs.	Pneumatic.	20
2000 "	"	20
3000 "	"	18
4000 "	"	16
2000 "	Solid.	16
3000 "	"	15
4000 "	"	13
5000 "	"	11
7000 "	"	9
10000 "	"	8
15000 "	"	7
20000 "	"	6

12. STOPS.

The number of stops per mile will have a considerable influence on the energy consumption of a given vehicle.

13. ACCELERATION.

It should never be too rapid; if it is, there is danger of damaging the engine or snapping a chain or gear.

It can be seen from the preceding items that there are a great many factors which influence the energy consumption and, therefore, the performance of a commercial vehicle.

BY TRUCK UP PIKE'S PEAK

With the object of accomplishing the most difficult and unusual "stunt" that a motor truck had ever been put to, J. P. Meyers, sales manager for the Rapid Motor Vehicle Co., who was in charge of the Rapid truck that accompanied the Glidden tourists from Detroit to Minneapolis, Denver and Kansas City last July, undertook to ascend to the top of Pike's Peak, near Denver, with the machine. The engraving herewith shows conclusively that the perilous trip was finally accomplished. The Rapid thus acquired the undisputed honor of being the first commercial motor vehicle to make the trip.

The distance of 18 miles, part of it over a practically unused road strewn with large boulders and logs, was traversed in parts of two days—July 26 and 27—the actual time of the ascent being 28 hours. The descent was even more dangerous than the ascent and required only 4 hours. In going up the mountain, which towers more than 14,000 feet above sea level, it was often necessary to drive a crow-bar between the boulders and attach one end of a rope to the truck, wrap the rope around the crow-bar and carry the other end back to the truck to prevent the machine toppling over down a precipice.

In speaking of the trip of the Glidden Tour, as a whole, and the Pike's Peak trip in particular, Mr. Meyers said: "The primary object of our putting a truck in the Glidden Tour was to determine definitely what might be expected of a commercial car under strenuous services over all kinds of roads. Successful operation on the well paved streets of the city does not by any means indicate the stability of a car."

RAPID TRUCK ON TOP OF PIKE'S PEAK—METEOROLOGICAL OBSERVATORY IN BACKGROUND

OMNIBUS CHANGE-SPEED AND TRANSMISSION GEARS

AT the present period when drivers of more or less considerable experience are in charge of many of London's motor 'buses, which include makes that have long since proved their high degree of efficiency, figures taken from experience to hand, may well represent the durability and cost of maintaining that portion of the heavy chassis, the quality and design of which is of such importance, viz.: the change-speed and transmission gear.

TYPICAL LONDON MOTOR OMNIBUS AND CREW—NOTE FRAME EXTENSION PROTECTING RADIATOR

Taking a well-known type of London 'bus—the Straker-Squire—and assuming that on an average the fleets in commission cover 90 miles a day for 240 days per year, we are given results for cost of renewals to change-speed and transmission gear as set out below.

Past experience teaches us that naturally the second speed wheels wear out first, but under present conditions of London 'bus work, they generally stand from nine to twelve months' service before requiring attention or renewal, and for the first twelve months' service we get a mileage of 21,600 miles, which may be covered at a cost for renewals to the portions of the chassis above mentioned amounting to £18.5.7 or .2003d. per mile. Seeing that just now the allowance for depreciation is reckoned at 20 per cent. per annum, this allowing for complete renewal of parts in five years, after a mileage of 108,000 miles, we get a total charge for the cost of renewing the change speed and transmission gear over this period of £163.13.9. or .364d. per mile for the whole period amounting to about 2s. 8¼d. per day, or little less than one-third of the total cost of renewals and repairs to the whole chassis, these having been previously calculated at 9s. 9d. per day.

Economy as far as the spare parts for renewals are concerned may be effected by making them at the 'bus depot, or by purchasing them in large quantities. Separately, however, the parts for the Straker-Squire 'bus change-speed gear and transmission run to £64.1s.6d. for a complete differential countershaft, bevel and differential gear ready for fitting. One change-speed gear set complete, £77.2s.6d., two silent chain rings £7.0.0. Two sprocket pinions, £3.1s.0. and a pair of silent chains about £11.0.0.

It might be well to add that 90 miles a day is a fair average 'bus mileage over long periods. For short periods much higher mileages are covered, for instance when the writer was investigating the above matter, he personally saw one of the London Road Car Straker 'buses which had covered 11,200 miles in sixteen weeks without a break.

The 32-horsepower De Dion 'bus when in capable hands seems well able to withstand wear in much the same manner as its chain driven sisters. Unfortunately the writer was unable to obtain figures from any large concern which operates this make, but a report from a user in Camberwell Road, London, who regularly operates three double-deck De Dions, puts the cost of maintaining the change-speed gear and transmission for six months at £8 7s. 0d. This is admittedly *very* low, but as it was taken for the first working 130 days, there is no reason to doubt that it is a reasonable and possible result. Of course the De Dion has always vastly differed from its fellows in service, but now the stage is past when only inexpert operators were available.

TURNER.

The Commercial Vehicle

Vol. IV September 1909 No. 9

Published Monthly by The Commercial Vehicle, Incorporated, at
1402 Broadway, New York City

Cable Address Comveh, New York
Long Distance Telephone 425 Murray Hill New York

H. F. Donaldson, President and Editor
H. W. Perry, Associate

Subscription Rates

United States, Canada and Mexico	One Year $2.00
Other Countries in Postal Union	One Year $3.00

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Changes in copy or in orders for advertisements for the month following must reach us not later than the 15th of the current month when proof is to be submitted, and not later than the 20th when no proof is required.

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Entered as second-class matter, September 13, 1906, at the post office, New York, N. Y., under the Act of Congress of March 3, 1879.

FIRE PROTECTION ECONOMY.

Of all destructive agents, fire, taken in the aggregate, is probably the most destructive of property, for while earthquakes and floods sometimes create greater individual disasters than the worst conflagrations, they come less often, and, unless they reach really disastrous proportions they cause small damage, compared with the mental terror they inspire; whereas, every fire, no matter how insignificant, results in some irreparable loss. For instance, last year was not characterized by any such calamity as the San Francisco fire, the Chicago fire, or the Baltimore fire, yet the approximate aggregate property loss by fire for 1908 was $258,000,000. When to this is added the hundreds of lives lost annually by fire and smoke, we are almost appalled by the realization of how terribly destructive fires are.

Probably all fires save those started by lightning and incendiaries are preventable, and the majority are due to a carelessness so nearly criminal that it seems as if some fit punishment should be provided for the negligent. But since the laws have no deterrent effect, we are obliged to depend upon means for extinguishing fires in the effort to save lives and property instead of relying upon precautions against allowing them to start.

Having started, a fire is extinguishable in a period of time and with a property loss somewhere nearly proportional to the square of the time that elapses between the instant the first tongue of flame flickers up and the application of the first stream of water. That being so, the insurance rate is lowest in that community which has the most efficient fire "protection," which means the quickest and surest fire remedy. Consequently, where there is much valuable property exposed to the possibility of fire, it is a matter of common sense economy to provide the quickest and most efficient means of putting out fires in their earliest stages. It would not take much hard figuring to calculate the precise saving to any community of a reduction of 1 per cent. in the insurance rate, and upon a proper showing such a reduction, and even larger ones, could be secured from the fire underwriters. The saving effected by a reduction of this kind would pay for a considerable increase in the cost of equipment and maintenance of fire fighting apparatus, yet it has time and again been shown by comparatives figures that, instead of costing more in actual outlay, motor fire apparatus costs less in the end than horse-drawn engines and carts. Of course, it is beyond the possibility of computation, but there can be no doubt that a very considerable part of the fire loss of $258,000,000 last year could have been saved had all the fire-fighting apparatus been quicker to reach the scenes of destruction.

In every demonstration that has been made of motor chemical engines, pumping engines, and combination hose and chemical wagons—and most of the cities of the country now have had the benefit of such tests—these machines have shown a very decided superiority in the matter of speed over the horse-drawn apparatus. With a special capability of from 30 to 60 miles an hour, the value of the motor engines grows as the distance to the fire increases, yet at very short distances the advantage is also in the fact that all of the power of the gas engine is at once available upon reaching the scene, whereas, the conventional steamer leaves the engine house with only a few pounds of steam and is unable to get up full pressure in the few minutes that elapse during a run of a quarter or half mile.

Apart from the possible saving to the community through a reduction of the insurance rate following the adoption of motor fire apparatus, material initial reductions in expense can sometimes be made in the construction of engine houses. In the first place, self-propelled engines and hose carts require much less space than the others, since there are no horses to be stabled, so that the cost of a single engine house is lower, and in the second place, the speed and endurance of the self-propelled apparatus enable it to provide protection for a larger area than heretofore, with the result that fewer engine houses are needed for a given territory.

This also means fewer firemen and battalion chiefs, with the consequent saving in salaries and wages; and there may also be further economies in the fact that the driver of the motor vehicle suffices for engineer, and that, once started, the gasoline engine needs no further attention, such as stoking and regulating water feed. Neither are supply wagons required to bring up additional loads of fuel, because it is easily possible for such a vehicle to carry in its tank sufficient gasoline to last all day, and in an emergency any person could be delegated to bring from a near-by store an additional supply of fuel.

It is in the matter of maintenance, however, that the most definite comparison can be made. It is claimed by the Webb Motor Fire Apparatus Company that bonds issued to cover the cost of installing self-propelled apparatus, and bearing interest at 5 per cent., can be retired in less than five years out of the saving from the usual maintenance appropriations. To prove this, it presents side by side the cost of maintenance of horse-drawn equipment, which is authentic and based on the cost of maintaining a fire department in a well-known Southern city, and the cost of maintaining motor fire apparatus compiled from data secured from Joplin, Mo., whose entire fire department is provided with motor apparatus.

In one case the equipment consists of four fire engines, three hose wagons, one combination wagon, one chemical engine, one supply wagon, one chief's wagon, and twenty-eight horses, and for handling these there are employed eleven drivers, four engineers and four stokers. The annual maintenance amounts to $24,380, and includes the cost of feeding the horses at $200 a year each, depreciation of horses at 20 per cent., blankets, stable tools, repairs to stalls and floors, veterinary and medicine, fuel for engines at fires, coke heaters for engines, and wages of nineteen men at $800 a year.

As against this there is motor apparatus of equal water discharging capacity, but with more than double the efficiency, and capable of covering four times the area of the horse-drawn equipment, consisting of four combination engines and hose wagons, two chemical engines and one chief's wagon. Only seven men are required for handling these, and the annual maintenance amounts to $7,819. This covers the replacements of tires at $150 annually for each vehicle, gasoline and oil aggregating $350 a year, kerosene for lamps, recharging the electric batteries for headlights, polish and rags, and the wages of seven men at $900 a year.

On this showing, it costs more than three times as much to maintain horse-drawn equipment as for motor apparatus. The first cost of providing the latter is $45,000. The first cost of the eleven horse-drawn vehicles is not given.

In all of this no account has been taken of the offensiveness to the firemen of occupying sleeping quarters above a stable, the handling of hay and grain, the removal of manure and the breeding of disease-carrying flies, which are now recognized as a serious menace to the health of every community.

AMERICAN VS. EUROPEAN CAB RATES.

Motor cab users returning from abroad are prone to complain of the relatively high rates charged by taxicab companies in this country, and their criticisms have had some influence in connection with the passage of the ordinance that goes into effect in New York City this fall making the maximum charge for the first half-mile for a four or five-passenger cab 40 cents and the maximum for two-passenger cabs 30 cents, instead of the initial charge of 50 cents that has prevailed this year among the large companies.

These complainants make their criticisms either because of thoughtlessness or as a result of ignorance, or both. It is pointed out by managers for New York taxicab companies that garage rental is not much more per year in Berlin, Vienna and other Continental cities than it is per month in New York; that chauffeurs here have to be paid $17 a week, while in European cities they can be hired for about one-third of this amount; that in Berlin and Vienna the city authorities look upon taxicabs as public conveniences, while in America they impose license fees, drivers' licenses and restrictions that necessarily increase the operating expenses and decrease the earnings.

One of the largest sources of expense to New York operating companies is the high charges made for private stand privileges by managements of hotels, railroads, restaurants, and so on. The proprietors of leading hotels realize that the exclusive right to carry guests to and from the hotels is a valuable asset, and they exact from the cab companies the last dollar that the traffic will bear.

Another reason for the difference in foreign and American rates is the ordinance in New York that prevents cabs occupying private stands under special license from "cruising" and picking up passengers at the curb wherever hailed. This prevents a cab which has carried a passenger from one of the hotels or railroad terminals to a destination from picking up a passenger on the return trip anywhere along the way. On the other hand, a cab operating under ordinary license is denied the privileges of the exclusive stand and at the same time must keep on the move in the streets when looking for fares. It is not allowed by the police to stand in the streets waiting for passengers while disengaged. Thus, the expenses are increased by the consumption of gasoline, oil and the wear of tires.

All these things militate against low cab rates in New York to such an extent that operating companies assert there is little profit in the taxicab business under present conditions.

SAVING AT THE SPIGOT

It looks like a case of defeated economy when a six-ton motor coal truck pulls up alongside of a coal hole in the sidewalk and tediously discharges its load through a sheet metal chute a foot wide and possibly three inches deep, while the driver hastens the process as much as he can with the aid of a broom stub.

Motor coal trucks represent a large investment and the main object in their use is to increase the amount of work done. Methods of loading and discharging should, obviously, be hastened in proportion to the greater load and speed capacity of the power truck over the horsed wagon. It ought to be possible to drive a coal truck under a chute and recive its load in five minutes or less and to discharge its contents through a chute of the largest capacity that is possible to be used in connection with the receiving holes in the sidewalks. The time that it takes to load and unload is a loss that must be charged up against the expenses of the business.

Similarly, motor trucks used for the handling of cases, barrels, pieces of machinery and other articles too heavy to be easily handled by two men could be made of greater efficiency by providing them with special means for handling the packages, such as a swivel crane built on the truck near the rear end. This has been carried out to some extent in electric trucks for hauling safes, which are fitted with a windlass driven by a small separate motor used for hoisting the safes to the windows of upper floors in tall office buildings, and in trucks fitted with power winches for drawing telephone and telegraph cable through underground conduits.

Ingenuity, judiciously directed, might devise various ways for hastening the process of loading and unloading motor trucks, thereby taking the greatest possible advantage of the very qualities in which the self-propelled vehicle lays claim to superiority over older methods of transportation. Eventually, when commercial motor vehicles come into almost universal use in the big cities, a general making over of shipping facilities may be expected in order to keep pace with the increased capacity for work possessed by the machines.

GAS MOTOR TRACTORS FOR AGRICULTURAL WORK—II*

Consideration of the Field as a Market for Commercial Vehicle Builders—Types of Machines Now on Sale in the United States and Abroad—Desirable Features of Construction

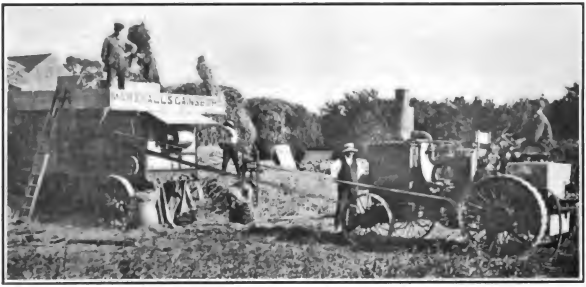
HENRY GODEFROY

OF the English agricultural tractors, the Ivel and the Marshall are the best-known. The Ivel machine, which is marketed in London, was first brought out in 1902 and is now in widespread use in various parts of the world. Probably for the reason that this machine was developed in a country of small farms it has nothing like the enormous capacity of some of the American machines. The Ivel will only draw a four-furrow plow, against twelve to the Transit Thresher previously described. On the other hand, it is a much smaller machine and will permit of very short turnings, making it possible to leave no more headland than with animal traction, a great advantage in countries of very valuable land.

The machine is in the form of a tricycle, with a small front steering wheel approximately 20 inches in diameter. The driving wheels are 41 1-2 inches diameter and 9 inches face. The power plant is a two-cylinder horizontal gasoline engine of 14 horsepower. The crankshaft is parallel to the axis of the driving wheels and runs at about 800 r.p.m. normal. The first reduction from the crankshaft to the jackshaft for going ahead is by a Renolds silent chain, and for reverse by a pinion and gear always in mesh. The drive from the jackshaft to the differential on the back axle is by silent chain. The normal speed is about 4 miles an hour and can be readily changed by changing the pinion on the jackshaft.

The forward and back gears are driven each by a separate cone clutch, both operated from the same lever to avoid any error on the part of the driver, who might otherwise try to have both gears in mesh simultaneously. The fuel consumed is stated as 1 gallon to the acre in plowing.

The Marshall tractor, built at Gainsborough, England, is a four-wheeled machine and bears some resemblance to the American type of tractor. The makers have been established in the construction of steam boilers and engines since 1848, and still employ about 4,000 men in that work. The tractor, here illustrated driving a threshing machine, is fitted with a two-cylinder vertical motor, the cylinders being cast in one piece. They are 6 1-2-inch bore and 7-inch stroke, and at 850 r.p.m. the motor delivers 30 horsepower. The valves are of the overhead rocker arm actuated type, the carbureter is claimed to accommodate any fuel without any changes being necessary. A large inverted cone metal to metal clutch transmits the power through spur gearing to a three-speed sliding gear box, giving 2, 4 and 6 miles per hour, and a reverse of 2 miles. It also carries a jack pulley for the driving of any machinery.


MARSHALL GAS MOTOR TRACTOR DRIVING THRESHING MACHINE ON AN ENGLISH FARM

The final drive is by spur gearing to the back axle. The differential can be locked when necessary, and a winding drum for emergency use is provided for the connection of block and tackle. The water cooler is a miniature water tower. It is divided in two portions and each receives water from one of the two delivery pipes from the gear water pump in a distributing chamber whence it passes through a series of holes to a set of inclined corrugated metal shelves, being thus spread in a current of air induced by the suction of the exhaust through a suitable ejector. The weight is approximately 4 1-2 tons. The illustration shows the machine occupied in stationary work actuating a large size, 6 feet 4 inches, thresher with 22-inch drums on a fuel consumption of 1 3-4 gallons of kerosene per hour.

Of the French machines, two types have been brought to a high degree of development. These are the Turgan and the Pilter. The Turgan is also built in England under license by H. P. Saunderson & Co. of Elstow, who market it under their own name. In France, the Turgan is built by the large concern of the same name which turns out all sorts of motor vehicles for road and rail service.

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*Continued from page 195, August issue.

For agricultural work the Turgan is usually built with three wheels, like the Ivel machine, but for the hauling of heavily loaded trucks on the highways it can be had with four wheels. In the three-wheel type all three wheels are driven, and steering is effected by the front wheels. The power plant consists of a four-cylinder vertical gasoline motor, 6 inch by 6 1-4 inch, developing 50 nominal horsepower at 850 r.p.m. A selective three speeds and reverse gear is used. Our illustrations represent this machine, under the name of the Saunderson, engaged in plowing, and also a newer model which shows a few changes in length of wheelbase and in radiator construction, engaged in hauling a truck loaded with a crate containing a motor car for export.

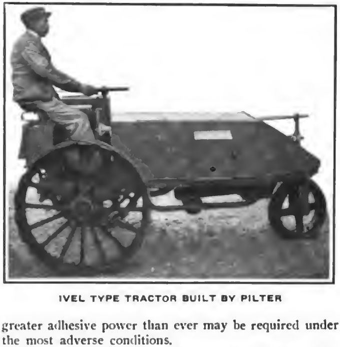
TURGAN TYPE TRACTOR BUILT BY SAUNDERSON OF ENGLAND GIVING PLOWING DEMONSTRATION

The Pilter machine built in France is identical with the Ivel built in England, previously described. A reproduction of a photograph of a Pilter machine with the driver in his seat is here shown. The general dimensions of the machine will be easily comprehended by comparison with the size of the driver.

The most important representative machines of the world's present production having thus been reviewed we shall pass to a study of the conditions which a satisfactory agricultural tractor should answer, and of the tendencies exemplified in the most improved modern machines.

One of the main points, and that which from the very beginning made the superiority of the gasoline tractor over steam, is that of lightness. It is inappropriate to apply to the agricultural tractor the usual reasoning that weight will increase traction. In this special case it simply will cause the wheels to sink in the soft ground and make it impossible for the machine to proceed no matter what power may be applied to it. Besides, the useless propelled weight simply means additional expense, and it should always be borne in mind that more than almost any other machine the tractor must essentially be an economical running machine. Traction on soft ground will much better be obtained by the use of pegs or suitable cleats on the driving wheels than through weight increase. In the design of cleats it should be borne in mind that a proper design has always been difficult, as mud and clay ground are liable to fill in the cleat, forming a greasy flat surface on the wheel worse than a plain steel rim would be as regards adherence.

Personally, the writer favors the screwed in pegs, staggered at fairly large intervals, too many pegs being just as bad as a cleat; this presenting the further advantage of rapid removal, especially in countries like France, where the use of cleated wheels is forbidden on the roads as destructive of the hard crust on the surface. Properly pegged wheels combined with an all-wheel drive, if the latter is efficiently and simply carried out, should give greater adhesive power than ever may be required under the most adverse conditions.



IVEL TYPE TRACTOR BUILT BY PILTER

The need of very large diameter wheels also could hardly be overemphasized as increasing traction as well as economizing power. A very large wheel will offer a considerable surface of contact, the weight per unit of surface will be reduced, sinking being prevented even in loose sand, and ground inequalities will be ridden over which otherwise would simply have blocked a smaller wheel. In fact, as regards efficiency, the writer would prefer a two very large wheel drive to an all wheel drive with wheels only half the size.

As regards the power plant, it is interesting to note the tendency towards the use of four-cylinder engines, the advantage of which lies in reduced weight and steadier impulses of smaller intensity at more frequent intervals. In fact, in this as well as in many other respects, a noticeable tendency exists among makers, the American especially, to more closely approximate motor vehicle practice than ever before, this showing that starting from an entirely different conception the trend of evolution comes under the same general laws in intelligent engineering. This can also be traced in the more complete enclosure of working parts in the high grade machines. In tractor work, whether the ground be dry or slushy, dust or mud is bound to be thrown on the mechanism or carried up by the wheels, wherefrom they are sprinkled over the whole machine. Protection of the working parts will insure greater efficiency and reduced upkeep, as well as prolong the life of the machine.

OIL-TIGHT CASINGS

One thing most important is the aim of simplicity and the exclusive use of such efficient mechanisms as can be made when oil-tight casings are provided. Numerous sets of gears and chains to produce the necessary gearing down of the speed are worse than useless, and their elimination shows the able engineer. The relatively large number of gear ratios provided on some machines are too close an adherence to the otherwise excellent motor vehicle practice, and simply make for increased complication; in fact, although greatly in favor of the sliding gear in auto and truck construction, the writer does not think it as well suited to tractor requirements, and believes that a simple two-speeds planetary gear a *separate* reverse gear equally efficient in both directions might be preferable.

It should be borne in mind that one of the great advantages of the gasoline tractor is that it does not require a specially competent licensed operator, and every effort must be made to put its operation within easy reach of the layman.

One point to which American makers seem to have paid more attention than their competitors is the ease of repairs of their machine, as exemplified, for instance, in the use of plain wooden blocks as frictional surfaces in the clutches and brakes.

Strange as it may seem to a majority, the writer would recommend the use of ball or roller bearings in every possible place, basing his opinion on their excellent behavior and advantages in durability and reliability over the plain bearings in all kinds of agricultural machinery from the lawn-mower up, more than on the favor they enjoy in motor vehicle construction.

THE QUESTION OF FUEL

One of the points often mentioned in this study is that of fuel. The tractor must of necessity be made a small consumer; it will have to work against animal competition, over which it scores mostly on account of time and labor saving, but if the fuel expenditure is too great it will offset this advantage to a considerable extent. It should be remembered that the work will often have to be performed in places where the fuel is only brought at considerable transportation expenses, sometimes increasing its price two or three fold. This brings out the question of heavy fuels cheaper than gasoline, and shows the evidence of their value if a satisfactory engine is made to use them.

From the foregoing text and the illustrations in which the machines are shown put at a variety of work, it is hoped that the desired object of calling attention to a promising field of activity will have been achieved, and that this will eventually prove useful to some of our readers in showing them the possibilities and profits which can be derived from its exploitation.

GRABOWSKY WAGON ON LONG RUN.

With the double object of establishing an endurance record such as has never yet been attained by a commercial car, and of making demonstrations of the wagon at certain places along the route where interest has been awakened in the machine, the Grabowsky Power Wagon Company, of Detroit, started one of its wagons from the factory in Detroit on August 4 for an overland trip to California, a distance of about 3,000 miles.

GRABOWSKY WAGON MAKING OVERLAND TRIP

The machine is in charge of J. V. Carr, of the Grabowsky company, who is accompanied only by his chauffeur. It was originally intended to enter this car in the Glidden tour, but this plan was given up because it would allow of no opportunity during the big event to stop at several important points to show the truck to merchants interested in the delivery of goods by motor.

SIGHTSEEING RATES CUT

Business of the sightseeing motor car companies in New York City has suffered to such an extent as a result of unfavorable weather and other conditions that the competition to secure passengers has become very keen. Ill feeling has grown up between the chauffeurs, and the companies have begun cutting rates. Beginning August 1, a cut from the prevailing rate of $1 for the uptown tour to 75 cents was made by the New York & Coney Island Auto Car Company, which posted signs to this effect at its stands at Fourteenth street and Broadway and Fortieth street and Broadway. The challenge was promptly accepted by some of the other sightseeing companies, which made similar cuts.

LINE-UP OF ELECTRICAL COMMERCIAL VEHICLES OPERATED BY ADAMS EXPRESS COMPANY IN INDIANAPOLIS

MOTOR DELIVERY IN INDIANAPOLIS, INDIANA.

THERE has been an increase of approximately thirty per cent. in the number of commercial vehicles in use in Indianapolis this year, and the number is still growing rapidly. This season has also found a number of new and interesting uses for such cars, at least innovations so far as the locality is concerned.

The largest user of commercial vehicles in the city is the Adams Express Co., which has nineteen electric trucks in service, replacing twenty-two horse-drawn vehicles. These trucks have been in use almost two years and have given satisfaction. In adopting electric vehicles the company had no hesitation in discarding immediately its entire horse-drawn equipment. The wagons and horses were shipped to smaller cities and towns. A brick garage, with concrete floor, was built and equipped with rheostats, washing devices, a complete machine shop and similar facilities. One of the trucks is used as a money wagon. It averages about thirty-six miles a day. All of the trucks are placed on slow charge at night, the charge being sufficient for a day's run.

The City Express Parcel Delivery Co. is using two trucks, one a Coppock, the other a Rapid. It delivers small packages for department stores and other concerns and also delivers parcels outside of the free delivery district for the express companies. The drivers are paid $15 a week each and the maintenance of the cars has been found cheaper than that of horses and wagons.

COLLECTING MILK BY MOTOR TRUCK

Probably one of the most interesting innovations is the collection of milk by the Polk Sanitary Milk Co., which has purchased two Rapid trucks, one of 1 1-2 tons and the other of 3 tons capacity. These cover routes within a radius of twenty-five miles of the city, gathering milk from the farmers and getting it to the city hours before it was possible with the old method. Formerly the farmer hauled his milk in cans to the nearest electric interurban station, where it awaited the uncertain arrival of the interurban freight car. It was then taken to Indianapolis and from the interurban station in the city was hauled to the creamery.

The Day and Old Danish creameries also employ gasoline cars for collecting milk, while a similar business is conducted by the Plainfield Transfer Co., of Plainfield, and by John Hogan of Indianapolis. Hogan runs a twenty-passenger Frayer-Miller car to Waverly and a number of small towns south of the city, carrying passengers and freight. Between midnight and 4 A. M. the seats are removed and the car is converted into a milk express, which collects milk cans from the farmers and hurries them to Indianapolis.

The Plainfield Transfer Co. runs a two-ton truck between Plainfield and Indianapolis, twenty miles, but the business is all from farmers. On the inbound trip to Indianapolis, milk is the principal article carried, the company charging at the rate of two cents a gallon for delivering it to the Indianapolis creameries. On the return trip agricultural implements, groceries and other things purchased by farmers are delivered direct to their homes.

ELECTRIC AND GASOLINE AMBULANCES

This year has also seen the first automobile ambulances in the city, and those who use them are getting the bulk of the business. The City Dispensary recently purchased a Waverley electric ambulance, which has displaced the horse-drawn ambulance used for fifteen years. The vehicle is equipped with electric fans and lights and has an extension electric light inside which is used by the physicians in making examinations of patients.

Flanner and Buchanan, undertakers, have purchased a Rapid ambulance, which they use in transferring sick patients. It also displaces a horse-drawn wagon used for a number of years and is operated more cheaply than the former vehicle. The car is kept at the garage of the Indianapolis Motor Car Co., with a driver constantly in charge, and calls are answered instantly.

The Premier Motor Manufacturing Co. has completed an ambulance for the A. M. Ragsdale Co., undertakers, which is built with an imitation limousine body so that curious spectators cannot tell the nature of the vehicle. There is no advertising matter on it, and for this reason it has been in considerable demand. The body is mounted on the regular six-cylinder Premier chassis.

CIGAR DEALERS UP TO DATE

Practically all of the local cigar delivery service is now done by motor trucks and delivery wagons. The Hamilton-Harris Co. has two Rapid delivery wagons; L. G. Deschler has a Cadillac and a Waverley wagon; the House of Crane makes good use of a Randolph and a Maxwell, while the Pierson Cigar Co. and A. Kiefer Drug Co. have Maxwell and Rapid cars, respectively, for their cigar deliveries.

It is also interesting to note that five wholesale paper houses use Rapid gasoline trucks. They are the Indiana, Standard, Crescent, Capitol and C. P. Lesh paper concerns.

VEHICLES IN PUBLIC SERVICE

All of the police patrol work is now done by motor vehicles, two Rapid cars replacing two one-horse and one two-horse wagons that were formerly used. In addition, the department has a National touring car for answering emergency calls and for running down violators of the speed law, and an Autocar runabout for inspection work.

Within a short time the Public Library will begin delivering books from the main library to the numerous branch libraries by motor wagon. At present this work is accomplished with horsed vehicles.

The Board of School Commissioners is now investigating the merits of numerous gasoline delivery wagons and will soon be ready to place orders.

AN EXCLUSIVE COMMERCIAL VEHICLE GARAGE

In connection with the local commercial situation, it is a matter of interest that Indianapolis has the only exclusive commercial vehicle garage in the State. It is conducted by the Indianapolis Motor Car Co., state agents for the Rapid and Hart-Kraft cars. Cars are sold on a maintenance contract plan when the purchasers wish to take advantage of the arrangement. Under this plan the buyer keeps his car at the garage and pays a monthly charge of from $15 to $50 according to the size of the car, and in addition also pays for the oil and gasoline used.

In return for this charge the garage company agrees to keep the car constantly in service, and to clean and inspect it each night. If it breaks down in service, an emergency car is sent immediately to take the load and complete the work until the injured vehicle is in service again. If the accident or trouble is due to poor inspection or to any fault in construction, no charge is made for the use of the emergency; but if the trouble is due to the driver's carelessness or to an accident, a rate of fifty cents an hour is charged.

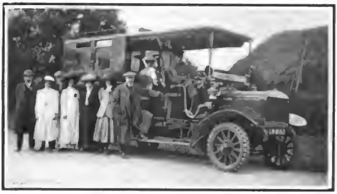
This arrangement has proved so satisfactory that the company now has about seventy-five cars under the maintenance contract and the demand for the service is so great that the garage will be greatly enlarged this fall.

MOTOR PARCEL DELIVERY IN INDIANAPOLIS

Indianapolis is an ideal city for the use of commercial vehicles, as the streets are broad, level, well paved and well kept. A large percentage of the city's wholesale and retail business is now conducted with commercial motor trucks and delivery wagons. CLARE.

PASSENGER AND BAGGAGE WAGON

An interesting type of commercial vehicle which is finding favor in England among owners of private estates, and which has great possibilities for country club and hotel service, is shown in the accompanying illustration. A number of such machines have also been exported to various parts of the world. It is built for the conveyance of passengers and baggage, the former both inside and outside, having seating capacity for about twelve adults. The snap shot here reproduced was made during a vacation trip in Surrey, England, during which a good average road speed was maintained and the machine showed excellent hill-climbing qualities. This type of vehicle has been put on the market by Commercial Cars, Ltd., of Luton, England. The car illustrated has traveled more than 23,000 miles on its own wheels, and the following schedule of operating expenses and maintenance costs, for that mileage, shows that it is an economical means of transit:



COMBINATION PASSENGER AND BAGGAGE WAGON

Tires, $525; gasoline, $650; wages, $810; repairs, $225; oil and greases, etc., $105; insurance and depreciation, $810; total, $3,125.

The annual automobile show or "salon" will not be held in Paris this year. The twelfth exposition will be opened in 1910.

The American exports of automobiles and accessories for the month of June, 1909, reached a total value of $1,115,864, as against $710,722 for the same month last year.

At a meeting held in Chicago recently 70 per cent. of the wholesale carriage builders decided to advance the selling price of vehicles 10 per cent. Increased cost of labor and materials is given as the reason.

The adjournment of Congress after the tariff debate left the duty on motor vehicles at 45 per cent. In the bill prepared in the Senate an increase to 50 per cent. had been incorporated, but in conference with the House, it was decided to permit the figures to remain as they had been.

In the recent Glidden automobile tour considerable attention was attracted to the use of kerosene as liquid fuel by a White steamer. Throughout the journey of 2,650 miles the car ran without smoke or smell and, on the way, supplies of the fuel were readily procurable at country stores, the price ranging from 6 cents to 10 cents cheaper per gallon than was paid for gasoline.

The Commercial Vehicle

Vol. IV October 1909 No. 10

STATUS OF MOTOR TRUCKING IN CHICAGO

Early Investment in Unserviceable Machines Caused a Reaction Which Is Rapidly Giving Place to Confidence in Present Commercial Vehicle Constructions

E. F. ROBERTS

THERE are at present several hundred motor trucks in Chicago. This represents an increase of nearly 100 per cent. in the last two years and, in the opinion of those familiar with the situation, this number will be doubled within a comparatively short time. The great majority of the motor vehicles are gasoline driven machines, the electrics are fewer in number, although performing some very important services. The machines in use are distributed through a great variety of businesses, no one industry or trade appearing to show special preference. The present situation, in fact, appears to be entirely experimental; the merchants, while willing to give the mechanically driven vehicle a trial, apparently seem a little dubious about its ultimate practicability. That the motor truck is, however, overcoming its initial handicaps and gradually finding its way into general favor is evidenced by the fact that several mercantile houses which have had one or two machines in use during the

KNOX GASOLINE MOTOR TRUCK IN SERVICE OF PIANO HOUSE IN CHICAGO past year have in the last few months given orders for from one to ten new motor trucks.

The extraordinarily rapid growth of Chicago from a prairie village to a great metropolis has resulted in the present existence of certain economic conditions unique among the great cities of the world. These conditions have effected trade of all kinds, but none, perhaps, in a more marked degree than the motor truck industry.

HEAVY DRY GOODS TRUCK IN CHICAGO

HANDICAPPED BY EARLY DISAPPOINTMENTS

It is a curiously anomalous fact that motor trucking has suffered in Chicago up to the present through the enterprise and originality of the city's commercial leaders. When the motor truck first loomed on the horizon, the merchants of Chicago realized its possibilities and eagerly adopted it. Those were the days when the mechanically driven vehicle was still in its experimental stages. The initial machines were disappointing; they broke down repeatedly and the flamboyant promises of their manufacturers seemed as empty as the idle wind. The natural reaction occurred. The disappointed merchants returned to their slow but surer horses and gave a skeptical ear to the blandishments of the motor truck salesman.

From that reaction Chicago is now slowly recovering. The motor truck is coming into its own, and its practicability, economy and general superiority over the horse-drawn vehicle is being understood and appreciated as firm after firm has successfully adopted it. One of the most significant proofs of the change in public opinion is found in the fact that some of the leading automobile manufacturers who had abandoned the commercial field have recently returned to the manufacture of motor trucks and are most optimistic in regard to its future.

BAD PAVING AND STREET CONGESTION

Two conditions confront the motor truck manufacturer and truck user in Chicago which must form a premier part in his calculations and which render the situation in the western metropolis essentially different from that in other cities. First and most important, the streets are bad beyond belief. With the exception of a few boulevards, the thoroughfares are such as would be a discredit to a frontier mining town. This is true even of State street and the principal traffic ways of the central part of the city. The boulevards are really not to be considered, as business traffic is excluded from most of them by law.

The second adverse condition is geographic. The elevated railroads center in what is known as the "loop district." This is a square formed by the elevated structure in the heart of the city, half a mile wide by nearly a mile long. Within this circumscribed area is confined by far the greatest number of the city's great commercial and mercantile enterprises. It follows that the haulage is greatly in excess of what should reasonably be expected; as a matter of fact, a motor truck is required to make a daily mileage of between fifty and sixty miles.

While bad roads and long haulage distances, together with the skepticism of those merchants who met with failure in the trials of the first motar trucks, have militated against the successful development of mechanical transport, it is the more worthy of remark that within the past year the motor truck has made big strides in popularity and that the outlook for the future is more than promising.

VEHICLE TAX FOR STREET IMPROVEMENT

The greatest of all the evils—bad roads—is being dealt with intelligently and effectively by the city authorities. To put the streets of a great city like Chicago in good condition naturally requires a vast amount of money. It cannot be all done at once and the city's finances are in such a condition that any immediate considerable outlay for this purpose could not be undertaken. In such a case the municipal government has decided to call upon the motor car manufacturers, as the persons most interested, to help them out. A tax of $20 a year has been levied on all users of touring cars and a tax of $30 a year for every commercial vehicle in use.

This will mean an income to the city of approximately $350,000 annually, which, in addition to the usual appropriation, will be ample to repave all the main routes of the city within five years. With this prospect in sight, automobile manufacturers have devoted themselves to the expansion and exploitation of their business with renewed energy and optimism, a proof of which is found in the appearance in the local field of three outside concerns that have hitherto held aloof from the Chicago market.

The motor truck agencies in Chicago at present include Adams & Engs, representing the Frayer-Miller truck; the Reliance Motor Truck Company, Fairbanks, Morse & Co., the Knox Automobile Company and the American Locomotive Company. The last named concern has only recently made its appearance in the market, and its debut is regarded in the trade as significant. The Studebaker, Packard, Rapid, Grabowsky, Couple-Gear and other important makes are also represented.

Practically only two types of vehicle are in use at present in the Windy City—the three-ton truck for heavy traffic and a 1,500-pound wagon for light deliveries. The latter is used to a fairly large extent by laundries, express companies and the smaller mercantile houses, while the former finds favor with such concerns as Marshall Field & Co., the Southern Cotton Oil Company Wild Brothers, and the great beef packing companies, as Swift and Armour.

PACKING HOUSES PLACE LARGE ORDERS

The earliest and most extensive users of the motor truck have been the stockyard corporations, and their patronage has been a striking testimonial to the particular adaptation of the motor truck to circumstances in which the horse-driven vehicle is under serious disadvantages. Packingtown, as the great stockyards district is known, is situated five miles from the central business district of Chicago, which means an equal distance from the freight depots and the various local distributing points. Without exception, every route from the beef packing plants is in a shockingly bad condition. In spite of the exceptionally heavy traffic which daily passes over them, no effective steps have ever been taken to put them in anything like tolerable repair, and consequently the wear and tear upon teams is very severe. A year ago the packing companies purchased five or six motor trucks as an experiment. How that experiment has resulted can best be judged by the fact that since the first of the present year orders have been placed for between thirty and forty more machines. Under the severest possible conditions the motor truck has therefore proved its worth, and the effect of the action of the packing companies is already being felt in a renewed confidence on the part of other merchants and a vastly improved outlook in the local commercial vehicle field.

Another encouraging sign is found in the attitude of Marshall Field & Co. who a year ago purchased two Frayer-Millers and a Packard. They had already in commission an electric truck which had been remodelled into a gasoline machine. Their experience in the last year has proved so satisfactory that they have recently placed an order for another power vehicle and are reported to be considering a still further increase in their motor truck equipment. This is of peculiar significance in view of the conditions under which they carry on their vast business. In outlying parts of the city and in the suburbs they have established sub-stations. Big wagons haul the goods from the main store to these substations, whence they are delivered to their ultimate destinations. This system, worked out in elaborate detail, is necessarily extremely expensive, but is necessitated when horses are the sole means of locomotion and the delivery area is as large as it is in Chicago. With the installation of the motor truck service, the Marshall Field managers found that they could cover from fifty to sixty miles a day with one vehicle and so do away entirely with the relay stations. What a tremendous gain this meant in economy may be imagined.

DELIVERY WAGONS AND THREE-TON TRUCKS PREFERRED

The trucks already mentioned have been of the three-ton variety, which is the standard truck for heavy deliveries in Chicago. Five-ton trucks have been experimented with, but have not proved satisfactory on account of the difficulty of building so heavy a vehicle sufficiently strong and durable to withstand the bad roads, and yet not be too cumbersome and unwieldly. The streets of Chicago would work havoc with the ordinary five-ton machine, but to build a special machine of this capacity would mean an increase in weight and cost of propulsion which would render it undesirable to the ordinary purchaser. For these reasons the three-ton truck has been accepted as the standard, and the choice ranges between this and the light 1,500-pound wagon.

This latter vehicle has found considerable favor already, and the manufacturers are extremely optimistic in regard to its future. It has been adopted with very satisfactory results by some of the minor express companies and by several of the big laundry companies. In a city which is spread over so large an area as Chicago and where the population is not concentrated, as in New York, the laundry business, if it is to find any considerable expansion, must be able to cover daily a large extent of territory. With horse-drawn wagons this was naturally impossible, and consequently the laundries were among the first to give a welcome to the motor wagon. They have adopted it to perhaps a larger extent than any other individual line of business, and their experience seems to be uniformly satisfactory.

The large express companies have for some reason been rather slow in adopting the motor truck, but within the past few months there seems to have been a change in this direction. The American and the Adams companies are at present experimenting with different types of machines, and it is practically certain that within a short time they will adopt motor trucks on their main routes at least. Curiously enough, they have been influenced to a large extent by the success of the motor patrol wagons which have recently been installed by the police department with highly satisfactory results.

DEVELOPING WAGONS FOR LOCAL NEEDS

Taken on the whole, the light wagon seems at present to be more popular than its heavier brother. One reason for this is probably to be found in the fact the Randolph Motor Car Company, which makes a specialty of these wagons, has devoted considerable time and effort to the

MOTOR WAGON USED BY CHICAGO LIBRARY

LIGHT DELIVERY WAGON IN SERVICE OF CHICAGO DYEING AND CLEANING HOUSE

production of a machine which would be specially adapted to local conditions. Most of the three-ton cars are manufactured by outside concerns, which sell their machines widely throughout the country, and are consequently forced to adopt a standard without particular reference to the needs of any individual place. The Randolph people, on the other hand, are primarily interested in the local trade and have popularized the light wagon to an important extent. Their plant is in Chicago.

With regard to the motor patrol wagons, it is noteworthy that the city authorities were among the first to realize the advantages and possibilities of the motor wagon and not only adopted it for the police department but also for the fire department. It has been extremely satisfactory in both instances, as is evidenced by the testimony of both Assistant Chief of Police Schuettler and Fire Marshal Horan. Both of these officials have testified before the city council as to the value of the motor wagons and have asked that the city make further appropriations for extra machines.

MONTGOMERY WARD & CO. ORDER NEW ELECTRICS

While the gasoline machines are first favorite in Chicago, the electric machines have not been altogether disregarded. The most notable user of electrics is Montgomery Ward & Co., the big mail order establishment. This concern has operated three electric trucks for some time and has found them so well suited to its business that it has recently given orders for seven new machines, making a total of ten for this single concern. Individual electric trucks are also in use to a considerable extent among smaller firms, but the advance in this direction does not appear to be so marked as in the gasoline motor wagons.

No drastic changes have so far marked the advance of the commercial vehicle industry in Chicago. The general design of the machines remains the same, although numerous minor changes have been made in their construction. The one point of interest in this direction appears to be the fact that the manufacturers are coming to regard conditions in Chicago as the standard by which they must guide themselves in designing their cars. They argue that a truck which can stand the wear and tear of the Chicago streets will prove more than satisfactory in other towns where the roadways are in better condition. This has had an indirect effect on the local trade, as it has lead the eastern makers to pay more attention to Chicago, with the result that they have awakened to the possibilities which lie in this hitherto somewhat neglected city.

TIRE MAKERS ALIVE TO SITUATION

The tire problem is, of course, one of the most important features of the truck industry, and here again Chicago has offered its own peculiar difficulties. The uniform badness of the streets has inflicted a heavy burden on tires and has exacted a toll on the user that is unknown in other cities. Besides the bad paving, the form of the street car rails has provided a difficulty all of its own. Up to within a few months all the rails in the city were of the flange form. In these rails the motor tires were cut and torn to pieces after a few months' service. The grievance grew to such an extent and meant such a serious handicap on the truck and tire industries that strong pressure was brought to bear on the city authorities, with the result that a change was ordered. On most of the principal streets now the grooved rail, such as is used in New York, has replaced the objectionable flange rail and a similar change will be effected on all the street car lines within a short time. This change has already had its effect on the industry.

More changes have occurred in the last two years in the tire trade than, perhaps, in any other branch of the motor car industry. The Goodyear and Firestone companies were practically the first to enter the Chicago field as far as the commercial vehicle tire was concerned, and up to a year ago had held almost undisputed sway. About that time, however, the other leaders in the East began to appreciate the possibilities which lay for them in the Western metropolis, and the Swinehart and Diamond appeared actively in the field. It is significant, however, that while there are now half a dozen concerns dividing the commercial tire business among them, the volume of business done by the older firms not only has not diminished but is steadily increasing.

The difficulties with which tire manufacturers have to contend in Chicago may be judged from the statement of Mr. Siegrist, local manager of the Swinehart company, whose experience extending over ten years in the West amply qualifies him to speak as an expert. Mr. Siegrist says that tires last only about one-third as long in Chicago as in New York.

"I believe," says Mr. Siegrist, "that a man could go out in Chicago and get all the business he might want on a basis of a six months' guarantee. However, I do not believe that any business man in the city would undertake to conduct a commercial tire concern on such terms as long as the Chicago streets remain in their present terrible condition."

LARGER WHEELS ADVOCATED BY TIRE MEN

According to local tire agents, a far greater advance has been made in their business than in the truck industry itself. Among the tire men it is the concensus of opinion that the tires made to-day are so far ahead of those made three years ago that there can be no comparison as to their relative merits. There seems a disposition, however, to regard the truck manufacturers as being at fault in respect to the size of their wheels. The prevailing size at present for three-ton trucks is 36 inches for both front and rear wheels. The tire manufacturers believe that a larger front wheel, say of 40 inches, with a 38-inch rear wheel would mean a great saving in the wear on tires. On the other hand, the truck men claim that they have experimented in every possible direction and that the 36-inch wheel is the best that experience has given them.

What the scope of the commercial vehicle business in Chicago may be is still unsettled, but the outlook has been rendered much more cheerful by the recent strenuous efforts on the part of the city authorities to improve the street conditions. Probably the greatest difficulty which lies in the path of the motor truck manufacturer is the extraordinary congestion of the wholesale and large retail business in the city. Notwithstanding these drawbacks, it must be noted that the general spirit among the motor truck manufacturers is one of extreme optimism. The increase in orders in the past few months and the exceptional interest which is being displayed by Eastern makers in the Chicago field seem to substantiate this feeling of cheerfulness and to give color to the idea that a great future awaits the motor truck in Chicago.

"GET AN AUTOMOBILE"

The slogan of the street gamin of "get a horse" has now been changed through the quick perception of the youngsters in the larger cities to "get an automobile" when a horse balks or becomes helpless on slippery streets. This new slang injunction was promptly put into practice in Massachusetts recently, when the fast race horse Hal Enisgn, owned by Coughlin Bros., of Maynard, fell in a race at the Woonsocket trotting park and broke one of his forelegs.

The owner telegraphed to the R. L. Morgan Truck Co., of Worcester, for help, and the company at once sent out one of its trucks in which the disabled horse was carried to the owner's stable in Maynard without having to make any changes of cars and in less time than would have been possible by rail. The truck was a five-ton machine. The horse was put aboard by means of a gangway and made its journey standing on three legs, appearing to enjoy its first motor car ride as much as a horse with a broken leg could enjoy such a trip.

A good roads statistician recently stated that there are 2,150,000 miles of public roads in the United States, of which scarcely 7 per cent. can be said to be improved.

The United States good roads officials state that the direct saving to the farmers of this country from properly constructed roads would be $250,000,000 annually; that there would be a saving of over $10,000,000 in marketing the wheat crop alone; of over $12,000,000 in marketing the corn crop, and of $5,000,000 in marketing the cotton crop.

In Germany the average width of the public roads is from 20 to 30 feet, while in the Middle and Western states of this country the roads are usually 66 feet wide, but practically two-thirds of the surface is given over to weeds, which furnish an inexhaustible supply of seeds for the adjoining farmlands. On the German roads there are no weeds, no mud or chuckholes, and no stretches of sand to impede vehicle traffic. Road maintenance receives attention as well as road making.

HEAVY ELECTRIC BEER TRUCK IN FRONT OF CAFE IN CHICAGO'S BUSINESS DISTRICT

ELECTRIC VEHICLE CONSTRUCTION AND OPERATION—VI*

Instructions on the Setting Up of the Lead Battery—Preparations for the Initial Test Including Charging and Discharging--Precautions to Be Observed in the Continued Use of the Battery

LOFTUS G. COADE

SETTING UP THE BATTERY

Coming now to the setting up of the battery upon its receipt from the makers, there are several points to be observed. Carefully unpack the crates containing the cells and dust off any excelsior or dirt which may have adhered to the plates; an old clothes brush will serve this purpose all right if it is not too stiff. The wooden separators are shipped wet, and if they are not wanted immediately they should be kept damp by pouring water over the crate from time to time, or by keeping them in a tub of water, which should have a cover on it to exclude dirt. Now scrape the lugs of all the plates and notches in the straps "bright" with a painter's triangular scraper, or a knife. Procure three pieces of wood and nail them together, as shown in Fig. 3, so as to form a support for the plates when they are being burned onto the straps. Take all the negative plates belonging to one cell, whatever the number may be, according to the size of the battery, stand them up in the box, inserting the lugs in the burning iron, Fig. 4, then place the strap on the top, resting on the iron plate. Now apply the flame to the top of the lug projecting over the strap, and melt it down to the level of the strap, adding more lead from a stick if necessary, till the notch is filled with molten lead, when it can be allowed to cool off and the next one taken, and so on until all the plates are joined to the strap. When all the negative plates are thus joined up, the positive plates can be treated in the same way.

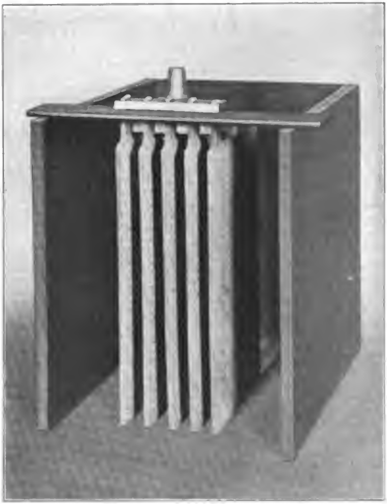


FIG. 3—SUPPORT FOR PLATES

It will be noticed that there are two shapes of straps, which will be apparent from Fig. 5. Care must be taken to see that the right halves are joined up, that is, positive to negative, or one-half of the battery would oppose the other half, and if the voltage of each was the same there would be no current. Before placing the separators in between the plates examine the latter carefully and trim off with a knife any lead which might have run down the sides of the plates. Now take a rubber separator and place it against the grooved side of a wood separator, keeping the rubber side next to the positive plate, and push the two up between each positive and negative plate until they are flush with the bottom. Place the elements in the jars and fill up with electrolyte (s. g. 1,200) to about ¼ inch over the plates. Allow the battery to stand for twelve hours and then place on initial charge.

THE INITIAL TEST

To prepare the battery for this charge it should be set up and the connections made in the manner illustrated diagrammatically in Fig. 6. The ammeter and rheostat are inserted in series with the battery and the voltmeter across the battery. It is important when connecting in the voltmeter to connect it across the battery only, not across the switch terminals, or it will indicate the potential drop of both the battery and rheostat—the drop across the battery is all that concerns us. By tracing

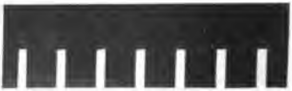


FIG. 4—BURNING IRON

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*Continued from page 172, July issue.

out the connections in Fig. 6 this will become quite clear.

When making the connections be very careful to connect the positive terminal of the battery with the positive side of the line. If there is any doubt as to which is positive, place the voltmeter across the switch, and as the plus terminal of the voltmeter is marked on the case it will show the polarity, as it will not indicate when connected the wrong way around.

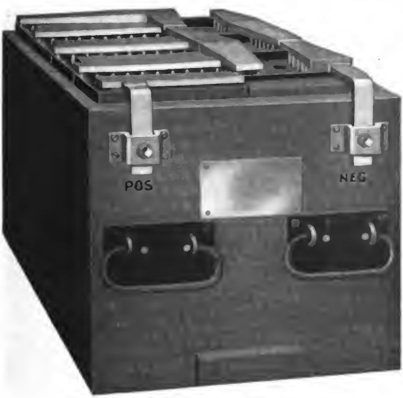


FIG. 5—EXIDE VEHICLE BATTERY

Now charge the battery by closing the switch and adjusting the current with the rheostat to one-fourth of the four-hour discharge rate. In making the initial charge it is imperative that the temperature of the battery be closely watched and the thermometer inserted in the cells at frequent intervals, and keep the temperature about 90 degrees Fahr., lowering the charging current if required. Should the temperature rise in spite of all this do not allow it to exceed 110 degrees, but open the circuit at once and allow the battery to cool off, when the charging can be resumed.

Now in order to ensure that the first charge has been a full one, the readings of both the voltage and specific gravity should be the same over a period of at least ten hours, and the readings should be noted down on a tabulated form. The reason for this somewhat lengthy charge for a new battery is that the plates are given a slight sulphating before being shipped, to prevent oxidation, which sulphate must be thoroughly removed before the battery is put into service. Now it is a physical law that substances, solid or liquid, expand with a rise in temperature, with a corresponding loss of density, and as the proper density of the electrolyte in a fully charged battery at normal temperature, about 80 degrees Fahr., should be about 1.280; an allowance must be made for the lesser density when the temperature is greater than 80 degrees. This allowance can be calculated at the should be about 1,280; an allowance must be made for the lesser density when the temperature is greater than 80 degrees. This allowance can be calculated at the rate of .001 for each three degrees rise of temperature.

The following table showing variation of density with increase of temperature has been prepared by the Electric Storage Battery Co.:

Specific Gravity.	Degrees Fahr.
1.280	80
1.279	83
1.278	86
1.277	89
1.276	92
1.275	95
1.274	98
1.273	101
1.272	104

It will be seen that if the hydrometer indicates a specific gravity of 1.275 when the thermometer stands at, say, 95 degrees, it is correct. If at the end of the first charge the voltage and gravity remain constant over the above stated period, but the latter is below standard, viz., 1.280 at 80 degrees Fahr., when corrected, it may be that the electrolyte is not up to proper density, consequently it must now be adjusted finally by adding acid of a higher gravity. But when the battery has been in use for some time, and the specific gravity is low, never add acid to correct it until the battery has had a long and full charge, as some sulphate may have remained on the plates and must be removed first by the charging current, or the battery will immediately begin to lose some of its capacity, which is certainly to be avoided.

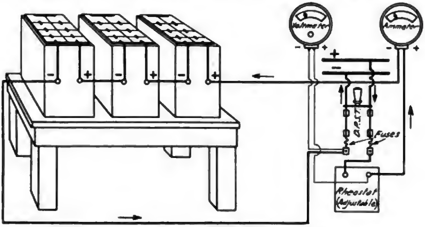


FIG. 6—CONNECTIONS FOR CHARGING TEST

DISCHARGING THE BATTERY

The battery after having been fully charged is now ready for discharging again. It should now be connected up as in Fig. 7, again remembering the proper position of the rheostat and instruments with regard to the circuit. There are various ways of discharging the battery, but the simplest and easiest is to take a barrel or a wash tub that will not leak, and three-quarters fill it up with water. Attach the terminals to two pieces of iron plate about 6 inches square, and place both in the water, hanging over two pieces of wood about 18 to 24 inches apart for a start. Close the switch now, but as the resistance of the water is high very little current will flow. On adding a little of the electrolyte to the water, however, in order to reduce the resistance the current will begin to flow, and the ammeter must be watched very closely, for fear of an overload on the battery. The adjustment of the current can also be varied to suit the battery by moving the iron plates nearer or further away from each other, but do not let them touch by any means. The rate of the discharge in amperes will vary with the type of plate and its capacity, but this can be obtained from any of the instruction books issued by the makers.

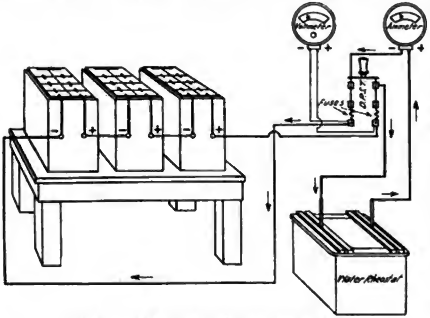


FIG. 7—CONNECTIONS FOR DISCHARGING TEST

Now as the discharge progresses the voltage will fall slowly until the voltage of each cell is about 1.70. This is better taken from the individual cells, although the total reading of 1.70 multiplied by the number of cells in series will do. The specific gravity will also be found to have dropped to about 1.210. It generally takes from two to three charges and discharges of this kind in order to put the plates in condition for giving out their maximum capacity. Should, however, the battery be required at once, do not more than half discharge it before putting on charge again for the first few times, when it can then be depended on to give its full wattage for the four hours.

A very important point to be observed is the level of the electrolyte. At all times the plates in the cells should be covered by the electrolyte, and as a matter of precaution the level of this should not be permitted to drop below ½ inch above the tops of the plates. During the charge some electrolyte is lost in the form of spray, and the cells should be examined periodically so that any shortage can be promptly made up from stock.

The life of the battery is determined by the number of charges. The greatest wear and tear occurs at the end of each charge, as the gassing disintegrates the texture of the positive plates. In view of this there is nothing to be gained by putting batteries on charge immediately the truck comes in, regardless of the amount of current taken out; on the contrary, this practice wears the battery out sooner, and in addition costs more for the supply current. Theoretically speaking, no lead battery should be connected up to the supply mains until at least 75 per cent. of the previous charge has been exhausted. In practice, however, it will not be found always possible to do this, as vehicles may be required to go out on long runs when, say, only 25 per cent. has been taken out.

LOSS OF BATTERY CAPACITY

Of course after a reasonable time, depeding on the service, the battery will begin to show signs of not being able to do its normal share of work. And on the first sign of this the cause ought to be looked into. First place the battery on a long low charge (out of the truck) and after prolonged gassing take the specific gravity, the voltage, and the temperature of each cell. Then discharge it, using the water rheostat as before, and at the finish take the voltage and the specific gravity as when on charge. Now notice what cells are low in specific gravity and voltage; cut them out and separately charge them, using a water rheostat if the wire rheostat will not give enough drop in order to limit the current to a proper charging value. When the cells are fully charged adjust the electrolyte to its proper value.

The material on the plates, particularly the positive, loosens from its support and falls down to the bottom of the jars, and it is necessary to remove this from time to time or it will cause short circuits between the plates if it should be allowed to accumulate. To remove this sediment, first charge the battery fully, then cut the cells apart, using a knife or hacksaw, then lift the elements out of each cell in turn and lay them on their sides, not flat. Spread the plates apart slightly and pull out the separators, and then wash the plates carefully by spraying water on them. It may appear on examination that the material on the negative plates has swollen somewhat and expanded over the ribs of the plates. In this case, and before they become dry, place them between smooth flat boards, one board between each plate, and pile them up with a heavy weight on top. A large letter-press will answer well for this, only unless the boards are thin, it is not possible to get more than a few into the press at a time. They should be kept wet in cleaning.

The electrolyte can now be decanted and the remaining sediment thrown away.

Sometimes the negative plates when drying become hot, and should they do so they ought to be cooled by spraying water on them. The rubber separators will keep if carefully handled and not broken, but the wooden ones after having been in the acid will not be worth much. If they appear in fairly good condition, when the battery is taken out of commission, they can be kept by placing them in water or dilute acid, but they must not be allowed to remain in the air, especially in contact with the plates. The jars should be well washed out before putting the plates back again.

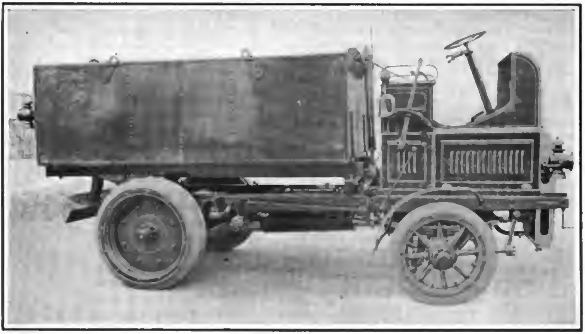
Now it is not possible in the compass of an article like this to go further or more deeply into all the minor ills that the storage battery is heir to. The makers cover the subject very well in the instruction books issued by them. All the makers are interested in the success of their product, and are always glad to lend a helping hand when one gets in trouble.

This concludes the storage battery part of the series, and in the next chapter the subject of the electric motor will be discussed.

GAS MOTOR MUNICIPAL WAGON

An interesting municipal tip wagon with two interchangeable bodies has been supplied to the order of the Westminster City Council by Leyland Motors, Ltd., of Leyland, England. In the chassis of this vehicle the makers have gone away from conventional British practice and have arranged the driver's seat above the engine in order to secure a short wheel base so as to enable the machine to turn more conveniently in traffic and narrow streets.

The power of this vehicle is developed by a 4-cylinder vertical motor, which gives 35 horsepower at 700 r. p. m. The four-speeds forward which the gearset provides are likely to take the car up any incline in spite of the fact that one of its bodies will contain 1,000 gallons of water. This body is shown in the illustrations. The other body is of wood arranged for a garbage wagon.



GAS MOTOR DUMPING WAGON BUILT FOR MUNICIPAL SERVICE IN LONDON, ENGLAND

The Leyland company has made a particular feature of the live axle as a means of final transmission, which is, of course, employed in the chassis of the wagon under notice. The design, the quality and the dimensions of the Leyland back axle are so good in fact that they have been known to run for as much as 70,000 miles without renewal. This gasoline wagon which the city of Westminster has just taken over has the following chassis measurement: Length, 14 feet; width, 6 feet 6 inches. With body: Length, 17 feet 6 inches; width, 6 feet 6 inches; height, 7 feet. The wheel base is 8 feet 6 inches.

TURNER.

TOOTH CHAMFERING ATTACHMENT

Manufacturers of commercial vehicles who cut their own sliding and spur gears will be interested in Bulletin No. 27, issued by the Long-Arm System Co., of Cleveland, O., illustrating and describing fully a little attachment (weighing only about eighty pounds) that is readily mounted on the table of a small milling machine and used for rounding or chamfering the teeth of spur gears. It is particularly adapted for chamfering the teeth of transmission gears, leaving such a smooth surface and uniform contour that further finishing is unnecessary. When run at its proper speed it can chamfer completely about twelve teeth a minute. Its normal range of work is on external gears, from 2-inch to 9 1-2-inch pitch diameter and of 4 to 10-inch diametral pitch. It is not, however, adapted to chamfering internal gears.

The Long-Arm tooth chamfering attachment was devised originally by the makers to facilitate their own work in rounding the teeth of spur gears in transmissions and was found so satisfactory that a few were built and found a ready market. The device now offered to all has been improved materially by tipping it through 90 degrees so that the axis of the gear to be chamfered lies in a horizontal plane instead of a vertical plane, thus increasing the range of work possible, as for example, chamfering a gear in the middle of a shaft. Another advantage is the facility with which the attachment can be swiveled on the bed of the milling machine so that the cutter forms any desired angle with the end of the tooth being chamfered. The countershaft is also simpler, as no idle pulley and countershaft are required. It is a very useful shop apparatus.

MOTOR TRUCKS FOR PUBLISHING HOUSE

One of the interesting sights in New York City is a great truck load of mail sacks being hurried to the Post Office in one of the two new Rapid motor trucks recently delivered to P. F. Collier & Son, publishers of *Collier's Weekly*. The larger of the two machines, shown in the accompanying photograph, is of 60-horsepower and 6 tons capacity. The other is almost identical in appearance, but is of only half the capacity, though driven by a 45-horsepower motor.

RAPID TRUCK USED BY COLLIER'S WEEKLY

The bodies of both machines are painted the new gun metal color, while the running gears are bright green striped with vermillion, the combination giving the trucks a very striking appearance. Goodyear solid endless tires are fitted to the big truck, 36 by 6 inches on the front wheels, and 36 by 4 inches, dual, on the rear wheels. The small truck has 36 by 6-inch Goodyears on the front wheels, and Kelly-Springfield dual block tires on the rear wheels. Indestructible steel wheels, also painted green, are fitted all around.

When the trucks are in motion a particularly noticeable feature is the easy spring suspension of the radiator, which is supported by trunnions between very flexible helical springs on either side, working in cylinders cast entegral with the radiator brackets bolted, as shown, to the main frame.

BALTIMORE GETTING UP TO DATE

Within a year many of the horse-drawn hose wagons and fire engines of the Baltimore Fire Department are likely to be supplanted by motor fire apparatus, if the recommendations of Fire Chief Horton carry any weight. The chief has reached his conclusions in favor of self-propelled apparatus largely as the result of the use of motor cars by himself and Deputy Chief Emrick in going to fires.

In his recommendations, Chief Horton says that motor hose wagons are superior to horse-drawn carts for use in the center of the city because they can make much faster time in responding to alarms. He holds the opinion that as yet the motor fire engines have not been perfected sufficiently for service in the business section but recommends them for use in the annex service. Fire companies in the suburbs frequently have to run several miles to fires and in going up steep grades or through deep snow horses sometimes become stalled. This causes a great delay and in some cases the engines never arrive at the scene of the fire. This difficulty, it is believed, would be overcome in self-propelled engines, which would also be able to make so much faster time that the destruction of much valuable property would be prevented.

One of the results of the chief's suggestions was the testing of a motor fire engine last month before the board of fire commissioners and other city officials. The machine was built by the American Motor Fire Apparatus Co., of Pittsburg, and the demonstration made a favorable impression on those who saw it at work. When the engine arrived in Baltimore it had completed a journey over the road of 624 miles from Detroit. Streams from four 7-8-inch nozzles were thrown more than 100 feet into the air under a pressure of 54 pounds to the inch at the hydrant. The pressure at the nozzles was 124 pounds to the inch. The volume of water thrown was 875 gallons per minute.

LONDON NEWSPAPER DELIVERY SERVICE

Our readers will recall a recent article illustrating the motor vehicles used for newspaper delivery service by the New York *Herald*, which we published. Now our London correspondent has supplied us with an excellent photograph, here reproduced, of a type of vehicle operated by the London *Chronicle* and *Lloyd's News*. This is fitted with a closed body and is British built, a product of the famous Thornycroft shops. The particular machine illustrated has been in service since last November, carrying loads of papers to railway stations weighing up to about 3,300 pounds. Since it was put in service the machine has not lost a trip and the owners are reported to be greatly pleased with the efficiency and economy of motor transportation in the service.

The motor power is a 16-horse power two-cylinder gas motor. The body is of the ordinary box van type, 9 feet 6 inches long, 4 feet 6 inches wide and 5 feet 6 inches high, with panels specially recessed to take a detachable illuminated mirror on each side. Immediately behind these two mirrors and the box on each side are inserted electric lights, which are switched on at night, and as the titles *Lloyd's News* and *Daily Chronicle* are in red and blue on a white background the effect is striking.

ENGLISH WAGON FOR NEWSPAPER DELIVERY

AGRICULTURAL TRACTOR TRIALS IN CANADA

Results of Brake, Hauling and Plowing Tests With American and English Gasoline and Steam Draft Engines in Nine Days' Events at Winnipeg and Later at Brandon

COMPETITIVE brake, hauling and plowing tests of American and English agricultural tractors were held at Winnipeg, Canada, from July 5 to 15 inclusive, and at Brandon, Canada, in the latter half of the same month. It was Winnipeg's second successful competition of the sort, and drew forth twenty-two entries and eighteen actual competing engines put in an appearance. Of these all but three were built in the United States, while the others were of English manufacture, three of the latter and two of the American machines being steam propelled. The thirteen other engines were of the internal combustion type, using gasoline as fuel. None was run on kerosene or alcohol.

Six of the eighteen machines were entered by the International Harvester Co., with headquarters in Chicago, which won two first and two third prizes. The Kinnard-Haines Co., of Minneapolis, with two starters, captured one gold medal first prize and the J. I. Case Threshing Machine Co., of Racine, Wis., with one steam traction engine, won the highest award in the steam class. With one steam and one gasoline engine the Avery Co., of Peoria, Ill., took a second and a third prize. Russell & Co., of Massillon, O., took two second prizes. As against this showing for America, the English firm of Marshall, Sons & Co. took one second and one third prize.

The characteristics of the different engines are given in the accompanying table, No. 1, which shows the classes into which the entries were divided as well as the technical details and the retail selling prices. The competition was open practically to all makers of farm motors or plows and there were gas engine tractors ranging in rated brake horsepower from 19 to 60 and in weight from 5,000 to 22,000 pounds; engines with one, two, three and four cylinders; driving wheels from 41 to 96 inches in diameter, and traveling speeds from 1 1-2 to 15 miles an hour; prices ranged from $1,700 to $3,400. The range in steam traction engines was from 60 to 111 specified brake horsepower, with simple, twin simple and compound engines, wheel diameters from 75 to 84 inches, weights from 2,600 to 40,860 pounds and prices from $3,250 to $4,050.

In table No. 2 are given the official results of the several tests through which the machines were put on the different days of the nine days' trials. The brake tests were for determining the efficiency of the machines for stationary power purposes, such as threshing. A special friction rope brake, constructed for the occasion by Prof. A. Grieg, of the Manitoba Agricultural College, was belted up to the belt pulley and after careful measurements of the water and fuel had been made, the engine

TABLE NO. 1—CLASSIFICATION AND TECHNICAL DETAILS OF COMPETING ENGINES

CLASS			Cylinders			Rated Revs per Minute				Horse-power		Pulley		Drivers							Weights		
	Entry No	Manufacturer	Number	Diameter	Stroke	Engine		Pulley		Nominal	Specified Brake	Diameter	Face	Diameter	Face	Total Width over Drivers		Miles per Hour	Capacity of Fuel Tank	Capacity of Water Tank	Total	On Drivers	Cash Price F. O. B. Winnipeg
A				ins	ins.	from	to	from	to			ins.	ins	ins	ins.	ft.	ins		gals.		lbs.	lbs.	$
Internal Combustion 20 h.p. and under	5	Int'l Harvester Co	1	8	14	250	300	250	300	15	19.5	36	9½	56	22	7	6	2¾	25	58	9,900	7,100	1700
	15	Avery Co	4	4¾	5	1,000	1,500	1,000	1,500	12	36	9¼	9	41	18	7	3	15	20	75	5,000	2,300	2500
	12	Marshall, Sons & Co	2	7	7	700	800	350	400	12	30	24	7	78	18	9	2	3½	30	54	14,500	..	2500
B Internal Combustion 20-30 h.p.	6	Russell & Co	3	8	10		350		350	20	44	28	10½	58	36	9	0		42	71	17,150	12,690	2400
	7	Int'l Harvester Co	1	8¾	15	240	290	240	290	20	28	40	10½	70	20	8	5	2.5	25	58	13,500	9,600	2200
	13	Kinnard-Haines Co.	4	6¼	7	.	650		325	30	45	30	9	84	18	8	1	2¾	26	180	13,875	...	2250
	17	Int'l Harvester Co	1	8¾	15	240	290	240	290	20	28	18	10½	70	18	6	8	2.4	25	54	12,500	9,000	2200
	21	Int'l Harvester Co	1	8¾	15	240	290	240	290	20	28	38	10½	64	22	8	6	2.5	25	58	12,600	9,400	2200
C Internal Combustion over 30 h.p.	2	Int'l Harvester Co	2	8¾	14	300	325	300	325	35	45	32	10½	75	18			3.5	54	97	20,000	14,000	2700
	3	Gas Traction Co	4	6	8	500	800	500	800	25	35	18½	9	96	18			...	37		13,600	9,000	2750
	8	Marshall, Sons & Co	4	7	7	700	800	350	400	25	60	23¾	10	78	24	10	3	.	61	79	22,000	16,570	3400
	16	Kinnard-Haines Co	4	7½	8		500	.	315	40	60	30	10	96	24	9	3		40	290	18,500		2700
	19	Int'l Harvester Co	1	10	15	240	290	240	290	25	30	40	10½	72	18			2.5	37	71	17,000	12,400	2400
																			lbs.				
D Steam Engines	1	J. I. Case Co.	1	12	12	..	230		230	32	110	43½	16	84	36	12	10	2.37	2,500	305	40,260	32,360	4050
	9	M. Rumely Co	2	7¾	14		235		235	36	120	40	12	84	40	12	0	2.33	1,400	400	37,000	...	3974
	11	Marshall, Sons & Co.	1	9 7⅛	12		230		230	25	60	37	10	75	30	11	2	2.25	850	200	26,000	17,000	3250
	14	Russell & Co	2	11	12		230		230	30	60	42	14	61	36	11	2	2.5 2.62	875	450	38,432	19,320	3400
	20	Avery Co	2	7	10	250	300	250	300	30	90	40	12	80	26	11	8	3.15	2,700	320	40,860	31,120	3650

TABLE NO. 2—RESULTS OF THE WINNIPEG BRAKE, HAULING AND PLOWING TRIALS

Brake Tests										Hauling Tests									Plowing Tests									
Entry No.	H. P. Devel'd	Revs. Engine Pulley	Water Used	Fuel Used	H. P. Hours per Unit of Fuel	Running Time	Mean Effective Pressure	Water Evap'd per lb. of Coal	Lbs. of Water per H. P. Hour	Load Hauled	Average Draw Bar Pull	Distance Travelled	Fuel Used	Time Hauling	1000 Ft. Lbs. per Unit of Fuel	Draw Bar H. P.	Draw Bar H. P. ÷ Brake H. P.	Water Used	Plows Number	Plows Width	Acres Plowed	Time Plowing	Average Draw Bar Pull	Water Used	Fuel Used	Fuel per Acre	Engine No.
			gals.	gals.		min	lbs.			lbs.	lbs.	ft.	gals.					gals.		ins.		min.	lbs	gals.	gals	gals	
5	19.7	249	4.18	1 47	13.4	60	89			13,370	1,350	26,800	3 64	105½	9,940	10.4	528	8 7	3	12	1.09	75½	1,510	8.12	1 64	1 5	5
15	17.9	865	7 5	4.3	8 3	120	46.3			7,604	818	45,560	5.43	117	6,867	9.7	.342	2.7	2	14	1.06	85	1,360	.35	3.57	3.36	15
12	....									13,870	1,650	21,440	10.21	111½	3,465	9 7	.	28	5	14	1.59	103	2,950	....	7.86	4 9	12
6	26 2	311	7.5	6 4	5.5	81	44.2			20,800	2,236	18,760	6.18	79½	6,787	16.1	615	12.5	4	14	1 7	121½	2,200		7 93	4 66	6
7	22.0	254	4 22	3 7	11.8	120	76			29,970	2,650	18,760	4 95	123	10,050	12.25	557	8 3	4	14	2 17	117	2,850	10.6	5.21	2 4	7
13	29 7	260	8.3	7 3	8 0	118½	52.6			19,480	2,395	24,120	6 93	98	8,336	17.8	.600	12	6	14	2.55	101	3,625	6 5	6.14	2 41	13
17	24 2	235	9 2	3 9	12.4	120	90 4			17,000	1,775	26,800	6.03	127¾	7,888	11.3	467	12	4	14	1 7	84.5	2,700		4.57	2.69	17
21	24.9	260	14 5	3.6	13 8	120	84			18,200	1,750	26,800	5.86	118½	8,007	12.0	482	17.7	4	14	1.7	91.5	3,100	10	4 29	2 52	21
2	46 0	292	21	12 1	7 6	120	73 8																				2
3	. .									21,090	2,750	24,120	11.0	96	6,030	20.9	.	4.6	6	14	1 27	44½	5,250		4 79	3.77	3
8	58 5	365	21.3	15 4	7.6	120	58 8			26,000	4,550	21,440	12.14	108.5	8,035	27 2	465	38	8	14	2.55	71	5,300		9.61	3 77	8
16	45.6	295	6 4	10.9	8 4	120	54.4			27,745	3,050	24,120	8.21	113 5	8,960	19.7	432	10	8	14	3 4	99	4,980		8.43	2.48	16
19	31.6	253	12	5.6	11.3	120	84			13,500	3,250	21,440	7.14	113.0	9,759	18.7	581	16									19
				lbs.									lbs.											lbs.	lbs.		
1	97.5	229	580	700	30	126	62	8 3	28 3	37,000	3,960	21,620	613	105	14,000	24.7	.253	496	12* 11‡	14	3.6	62	9,300	348	442	123	1
9	105.5	238	771	1,034	20 4	120	66	7.4	36.5	40,260	4,860	24,120	666	127	17,580	28	265	536	14	14	4 29	75	9,860	..	580	135	9
11	..																										11
14	66 8	211	435	442	30.2	120		9 8	32.5	34,000	4,200	21,400	664	119	13,500	22 8	341	376	10	14	3 18	76	7,400	470	454	143	14
20	73 6	254	320	815	18 1	120	74 5	6.4	35.3	34,000	4,200	18,760	500	95	15,750	25 1	341	396	8 10	14	4.0	72	7,900	.	510	127	20

NOTE—Fuel consumption is stated in Imperial Gallons (277.27 cu. ins.) or 100 lbs. of coal. Length of ground plowed, 1,980 feet. Length of hauling course, 2,680 feet.

was started and run for one or two hours in most cases, readings being taken in the interim to determine the brake horsepower developed, revolutions per minute of the pulley, and the mean effective pressure. At the end of each run the remaining water and fuel were again measured to find the consumption. In all but a few cases the developed horsepower exceeded the nominal horsepower and was less than the specified brake horsepower. The nominal rating given by the builder does not mean much, and the specified brake horsepower as given by the manufacturer usually means the maximum power developed under factory test, while brake power developed in the trials may be assumed to be the most efficient work of the engine with regard to fuel and water economy—in other words, the power of most interest to the user who runs the engine continuously.

The hauling tests were held over a circuitous course of 2,680 feet in a dirt field in which there was a soft spot of loose earth and gravel that had to be traversed twice in each round and which determined the maximum load that could be hauled. The lighter engines hauled one or two loaded wagons, while in the case of the heavier gasoline tractors and steam engines the loads were made up of dead engines and wagons or of engines alone. The turns were too short to permit of more than three wagons in a train, and these were insufficient to absorb all the tractive effort of the larger engines. The tractive effort was determined by recording dynamometers and is expressed in pounds in the column for "drawbar pull."

For the plowing tests, which were of most popular interest, the ground was accurately surveyed and carefully staked off in lengths of 1,980 feet. Part of the field was virgin sod of the "gumbo" variety, while other parts had been plowed in last year's trials. A heavy rain that fell in the afternoon of the first day delayed the tests somewhat. The draft of the plows was recorded by dynamometer as in the hauling tests. Coupled to a two-furrow gang plow, the Avery "wagon tractor," a general utility farm tractor intended for use in the field and on the road, turned over 1.6 acres in 85 minutes on a consumption equivalent to 3.36 gallons of gasoline per acre. The International Harvester 15-horsepower gas tractor, which made the highest number of points in the whole series of trials, plowed 1.09 acres with a three-furrow 12-inch bottom plow in 75 1-2 minutes on a consumption of 1 1-2 gallons per acre. Other results will be found in table No. 2. The largest plows handled were a fourteen-furrow 14-inch gang hauled by the Rumely steam engine, which plowed 4.29 acres in 75 minutes, and a twelve-furrow 14-inch bottom gang with which the Case steam engine turned over 3.6 acres in 62 minutes.

TABLE NO. 3—POINT SYSTEM FOR FIGURING SCORES

	Points
Brake test	20
Plowing test	20
Protection of working parts	5
Variation of speeds	10
Clearance of working parts	5
Price	10
Distance travelled without replenishing	10
Hauling test	15
Turning capabilities	5
Accessability	10
Ease of manipulation	10
Steadiness of running	5
Design and construction	20
Total points,	145

TABLE NO. 4—AWARDS IN WINNIPEG TRIALS

Class	Prize	Entry No.	MANUFACTURER	H.P.	Points
			Gasoline Engines		
A..	1st...	5	International Harvester Co...	15	115.4
	2nd..	15	Avery Co..........	12	106
	3rd...	12	Marshall, Sons & Co.........	12	100
B...	1st...	7	International Harvester Co...	20	112.1
	2nd..	6	Russell & Co..............	20	106.8
	3rd ..	21	International Harvester Co...	20	106.5
C....	1st...	16	Kinnard-Haines Co..........	40	109
	2nd..	8	Marshall, Sons & Co..........	25	102
	3rd...	19	International Harvester Co...	25	100
			Steam Engines		
D....	1st...	1	J. I. Case Co...............	32	121.3
	2nd..	14	Russell & Co...............	30	118.5
	3rd...	20	Avery Co...................	30	115.7

TABLE NO. 6—AWARDS IN BRANDON TRIALS

Class	Prize	Entry No.	MANUFACTURER	H.P.	Points
			Gasoline Motors		
A....	1st...	1	Avery & Co..............	12	111
	2nd..	2	I. H. C...................	15	99.78
B ..	1st...	3	I. H. C...................	20	121.04
	2nd..	4	I. H. C...................	20	113.03
			These were the only motors in this class.		
C....	1st. .	15	Marshall, Sons & Co.........	25	111.32
			This was the only motor in this class.		
			Steam Engines		
D....	1st...	12	Avery Co..................	30	139.58
	2nd..	7	J. I. Case Co...............	32	136
	3rd...	9	Gaar-Scott Co............ ...	25	132.07
E....	1st...	10	J. I. Case Co...............	20	137
	2nd..	5	Avery Co..................	20	135.54

TABLE NO. 5—RESULTS OF BRANDON BRAKE, PLOWING AND TURNING TESTS

				BRAKE TEST (20 POINTS)							PLOWING TEST (40 POINTS)												PRICE (10 POINTS)			TURNING (5 P'TS)		P'TS* 80–90	
Class	Entry No.	MAKES	H. P.	Rated B. H. P.	Actual Brake H. P.	Total Weight Fuel Used	Total Weight Water Used	Lbs. of Water per Lb. Coal	Lbs. of Fuel per H. P. Hour	Score for Brake Test	Number Plows Hauled	Width of Furrows	Total Time	Total Fuel Used	Total Water Used	Acres Plowed	Lbs. of Fuel per Acre	Score for Plowing	Score for Quality Plowing	Water Used per Acre	Score for Water Used (4 points)	Lbs. of Water per Lb. Coal	Price f. o. b. Brandon	Price per Horse-power	Score on Price	Turning Diameter	Score for Turning	Protection, Clearance Const'n. etc.	Total Score
						lbs	lbs	lbs	lbs.			ins.	min	lbs.				pts.	pts.	gals					pts	ft.			pts.
A	1	Avery ..	12	30	16	35	0	.	1.094	7.3	3	14	465	10	6	.848	11.79	10	13.5				$2,500	$156.25	2.3	42½	2.9	75.5	111.5
A	6	I. H. Co.	20	28	20.3	22	96		.53	15	4	14	60	21	22	1.131	18.57	6.33	12.3			...	2,100	100.00	3.6	15½	4.2	58.5	100.13
B	2	I. H. Co	15	19	21	17.5	54		.416	19	3	16	57	20	22	1.43	13.79	8.54	10			.	1,200	80.95	4.7	18½	4.1	60	106.34
B	3	I. H. Co...	20	28	25.9	26	93		.50	15.8	6	14	52	12	44	1.7	6.46	18.2	17.5			..	2,200	84.00	4.3	18	4.1	61.5	121.4
B	4	I. H. Co...	20	28	26	34	96		.654	12.2	6	14	44	10½	22	1.7	6.17	19	12				2,100	80.77	4.7	17½	4.13	61	113.03
C	15	Marshall..	25	60	59	100.25	408		.80		12	14	27½	23	162	1.7	13.52	8.7	11			..	3,500	60.34	6	62	2.9	71.5	111.2
D	2	Case ...	32	110	93	748	5,922	7.9	4.02	15.5	12	14	18	135	834.4	1.454	92.8	12.56	16	505	2.47	6.17	4,105	44.50	8.7	35	3.25	79.7	137.68
D	9	G. Scott..	25	76	76	754	5,312	7.04	4.96	15.2	14	14	20½	154	621.6	1.98	77.7	15	14	313.6	4	4.03	3,255	49.40	7.3	21	5.95	25.25	134.2
D	11	Rumely...	30	90	90	715	5,598	7.84	3.97	10	14	14	20½	278	74.20	1.98	140.4	8.3	14.5	132.8	92	8.7	3,043	40.00	9	38	3.1	71.2	126.02
D	12	Avery ...	30	80	94	930	5,093	5.47	4.94	15.6	12	14	29	182	600	1.454	125.1	9.25	17.6	343	3.65	5.5	3,250	40.00	9	29	3.5	79.8	138.38
D	13	Rumely...	25	75	78.4	654	4,992	7.63	4.17	18.1	14	14	15	192¼	1460	1.98	97.2	11.9	14	747.4	1.65	7.58	3,188	40.90	9	36⅝	3.15	79.2	136.95
D	17	Rumely...	36	120	99.5	1032	6,000	7.75	5.185	14.56	14	14	20½	197	1720	1.98	99.5	11.71	15.5	873	1.43	6.75	4,400	44.22	8.2	27	3.65	79.2	134.25
E	5	Avery ...	20	60	64.9	630	4,312	6.84	4.84	13.6	8	14	16½	119	500	1.131	105.2	11.14	14	442	2.8	4.2	.	....	8.5	26	3.7	79.8	135.54
E	10	Case.	20	60	62.9	330	3,967	7.21	4.32	17.1	8	14	16½	131	756.4	1.131	115.8	10	10.5	668	1.84	5.78			8.5	22	3.9	79.64	137.28

Classes A, B and C, gasoline engines. Classes D and E, steam engines. *80 points are basis for marking gasoline engines, 90 points for steam engines. Possible points for gasoline engines, 155, for steam, 165.

Awards were made on a point system, first prize in each class being given to the engine credited with the highest number of points out of a possible 145 points representing a perfect score, in accordance with a predetermined score card, shown in table No. 3. The championship prize was awarded to the International Harvester Co.'s 15-horsepower gas engine tractor officially known as No. 5, which gained 115.4 points, although three of the steam engines made higher scores. The award of prizes and the number of points gained by each prize-winning engine are given in table No. 4.

The Brandon trials were similar to those held in Winnipeg except that there was not enough time to include hauling tests. The entries and results of the trials will be found in table No. 5, and the awards in table No. 6. Championship prizes were awarded to the Avery Co.'s 30-horsepower engine, which gained the highest number of points in the steam classes, and the International Harvester Company's twenty horsepower tractor in the gasoline classes.

When the puchase of a motor fire engine was under consideraion by the department in Decatur, Ill., recently, it was decided to get expressions of opinion from the fire chiefs of cities where such machines were in operation. From Lansing, Mich., Fire Chief Hugo R. Delfs wrote as follows: "The automobile fire truck is a success in every particular. I have run it over frozen ground and through snow eight inches deep. I have sent the machine to places where the horses could not go. Our machine has been in use for the last eight months. In the 136 days it has been operated we answered 71 alarms and pumped water for 10 hours and 56 minutes, four hours at one blaze. The expense for operating the machine was 18 1-7 cents per day for gasoline and oils. You cannot buy the bedding for the horses at that figure, to say nothing of the feed that is needed, and the care that is required in a horse department." This is a fair example of the experiences of fire department officials of many of the smaller cities in this country with motor driven apparatus.

ON THE SUBJECT OF COMMERCIAL VEHICLE BODIES*

Different Woods Used and Methods of Making and Joining Sills, Posts and Slats—The Importance of Ironing and Most Approved Ways—Construction of Tops

By MORRIS A. HALL

PASSING now from the types of bodies used on commercial vehicle chasis to some of the components, we find that no other thing is so important as the materials used. Metal bodies do not demand much attention, as they constitute so small a minority. All metal bodies have been built of structural steel. The sides are of steel plates reinforced longitudinally at top and bottom by steel angles or bars, and reinforced transversely on the sides by tees, angles or zee bars. Circular tanks for carrying liquids are built of a helical form of steel known as tank steel and reinforced by flat steel bands. Fig. 6 shows a cross section through a steel body for a dump wagon.

Coming next to bodies in wood, we find that the sills are the most important part. These must be strong and tough yet resilient to the extent of having some give or spring. This necessitates the use of very high class material. White oak, which is commonly used, is hard to obtain in large sizes and free from cracks and checks. Next in favor to this comes ash, which is easier to obtain but is not so good. It is a hard wood and not as easy to work up as oak, but when used it gives satisfactory results. Next is red oak, which is easier to obtain in commercial sizes than either of the others, but is not so strong as the white oak. It is, however, used much more than any other material. Hickory makes a very good sill, but in the sizes required the material is very hard to obtain and the cost prohibitive. It is the toughest wood of the four but is seldom used, owing to the difficulty of getting it.

In buying, sill lumber is usually proportioned to the body size; moreover, it is customary to buy the four sills of a body in one stick of timber. Thus, suppose a 6 foot by 12 foot body for fairly heavy service. Two sills 12 feet long and two sills 6 feet long would be required, so that all four would cut from a 13-foot plank. The side sills would be about 6 inches wide and the front and rear about 8 inches. Allowing 1-4 inch for each cut and about 1 3-4 inches on each edge of the plank for straightening out the rough edges of the lumber, we get a total width of 24 inches. So we would order the required number of planks 3 inches by at least 24 inches by not less than 13 feet. Cutting all sills from one piece saves a great deal of work and is economical.

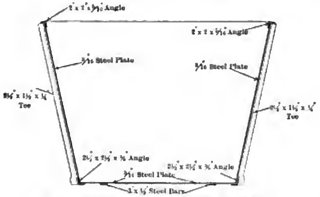


FIG. 6 SECTION THROUGH STEEL DUMP WAGON BODY

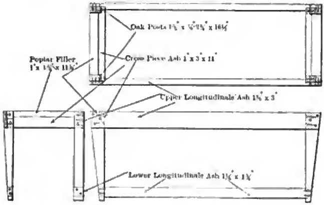

Oak Posts 1⅜" x ⅝"-1⅜" x 16½"
Poplar Filler 1" x 1⅜" x 11⅛"
Cross Piece Ash 1" x 3" x 11"
Upper Longitudinals Ash 1⅜" x 3"
Lower Longitudinals Ash 1⅜" x 1⅜"

FIG. 7 UNDER FRAME FOR SIGHTSEEING CAR SEAT

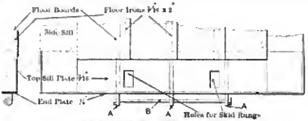


FIG. 8 REAR SILL AND IRONS

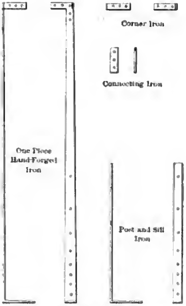


FIG. 9 ONE-PIECE AND THREE-PIECE IRONS

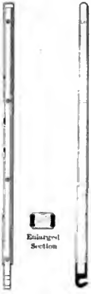


FIG. 11 SKID RUNG

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*Concluded from issue of August, 1909, page 109.

The flooring usually receives very little attention and may be of any material that wears well and is not brittle. The writer has known of the use of white pine in cheap cars, but this practice is to be deprecated. Southern or long-leaf yellow pine is excellent, and the resinous nature of the wood aids in keeping the floor clean; that is, oils and grease will not soak in, to collect dirt later, but will lie on the surface and may be wiped off, leaving the floor as clean as new. These woods are cheap and plentiful. Other good floor materials are oak and ash, but these are found only in the best cars. Sightseeing cars have ash floors.

For posts, oak, either white or red, is most suitable, but for stakes or rungs, as they are variously called, the material universally used is selected hickory. Panels are generally of poplar or white pine, beadings and mouldings of poplar, canopy top frame of ash, longitudinals of poplar, and slats of ash or oak. Tool boxes, which are severely used, are made of oak except on the more ornamental cars, where the writer has known of the use of mahogany or walnut. Posts, panels, floorings, etc., of truck cabs are constructed of the same materials as similar parts of the bodies, but the dashboards vary. On trucks these are selected oak or ash boards, but for passenger cars where better appearance is desired mahogany is freely used.

In passenger cars the same material is used for sills and posts as in trucks, but floors are of ash, panels and beadings of poplar or white wood, and frames of ash. Fig. 7 shows a typical under-frame construction for a sightseeing car seat.

Passing on from materials, the next most important thing is the ironing of the body. If a body is not properly ironed at all important points, it is sure to depreciate rapidly; much quicker, in fact, than any other part of the car. On passenger cars the ironing is not so important, as the use of irons is confined to the protection of panels and sills at the entrances, and to the reinforcement of the seat back construction.

The rear sill in a truck chassis is always a vital point, as almost invariably the loading and unloading is done over this. So it is good practice to cover this, top and sides, with metal (Fig. 8). The top is covered with a single plate of sheet iron 1-8 inch or 3-16 inch thick the full width and length of the sill; that is, the entire width of the body. The iron is held by bolts with countersunk heads, and holes are cut through the metal and sill for the skid rungs or stakes.

Then the back and ends are covered by a plate from 3-16 to 3-8 of an inch thick, according to the service, bent around the corners. Through this strip pass the bolts *A* which carry the rod *B* across the back. This rod must be of the best quality of soft steel or Norway iron, which will stand repeated bending without breaking. It is used for many purposes; in loading and unloading, the skid rungs are supported or hung from it; in tieing or lashing a bulky load, and in hauling other trucks or loads, the ropes are passed around it.

The corner irons should be a matter of concern to every prospective purchaser, for with proper ironing even a cheaply constructed body may be made serviceable, although this practice is not recommended. All posts should be ironed to the sills and floor boards inside and to the sills outside as a matter of protection to the post and to strengthen the construction. Also, wherever the slats or bars cross the post, the iron should be bolted to both, lending strength where the post has been weakened by cutting. In a covered body there should be a stout iron at the inside corner of the top and at the points where all posts join the top. At the rear posts all three irons should be used. A cheap, flimsy car will have these as three separate and distinct irons, which give no strength to the post nor to the point where the post meets the top. A reputable and careful builder, on the other hand, will go to the expense of making a single iron for all three places. This must be hand forged to fit each individual case. The material used is soft steel bars. A 3-inch-wide post will take a 2 1-2 inch by 3-8 inch iron, which is thickened to 5-8 inch at the lower corners where the strain is greatest and is tapered to 1-4 inch or 3-16 inch by 1 3-4 inches at the ends. The one-piece hand-forged iron is contrasted with the three individual braces in Fig. 9.

A body of the express type without a top should be ironed just as well as one with a top. The vertical sides should have irons as well as the sloping top board. The irons on the outside, which are plain and straight, should be bolted through the post and panel to the inside irons which hold the top board in place. In Fig. 10 is shown a body which illustrates this. There are four short vertical irons on the outside, four forged angled irons on the outside and seven forged angled irons on the inside. These are bolted together so that at four places on each side there are three irons, two on the outside and one on the inside.

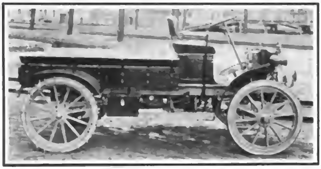

FIG. 10—SHOWING METHOD OF IRONING

Similarly, all floors should be ironed to prevent the hooped edges of barrel or cask ends, box corners or any sharp points or edges from cutting the floor boards. This iron is usually 1-8 inch thick by 1 1-2 inches wide and the strips are placed about 11 inches apart, thus covering the cracks between the floor boards, which are 1 inch or 1 1-4 inches thick by 12 inches wide. The back of the driver's cab, where one exists, is ironed the same as the floor. However, if small casks are to be handled, a narrower spacing would be necessary, and with extra large, heavy barrels, such as oil barrels, a heavier iron would be used, probably 3-16 inch by 2 inches.

Side gates or openings should be protected by metal strips let into the faces of the woodwork and meeting one another as well as the plate on the sill, the same as at the rear.

Stake pockets, or "rung boxes," as they are termed, may be of cast iron, malleable iron or cast steel, and in extreme cases forged steel. The steel boxes are preferable. These are bolted or screwed to the sills (never to the panels) and the lower end of the stakes should be shod on both sides with hand-hammered irons. The skid rungs, on the other hand, should not only be ironed at the foot but along the whole length. This is not a difficult job for any carriage blacksmith or wagon builder, but from the hands of the ordinary smith it is a sight to behold. As shown in Fig. 11, the iron should be let into the stake for the whole length. This costs the manufacturer real money, and the customer must pay for it, but a well-made rung of this sort is practically indestructible and should last for many years, despite the hard usage it receives.

The method and extent of the ironing to some degree govern the minor details of the woodwork. Thus, it makes a much superior job in every way to let the panels and bars into the posts. Unless good irons are used this would not be advisable except with unusually heavy posts, because cutting into the post weakens it. But the weakening caused by cutting is more than offset by the use of good irons, as described above. Without the irons this superior construction is impossible. The ordinary, cheap method has the slats or panels nailed or screwed on the outside. Hence, an outside iron is practically impossible. Fig. 12 shows a full side view of a two-ton truck for bulky loads requiring some protection, as referred to in the preceding article. By looking closely, the five rows of carriage bolts which hold the panel and the irons inside to the posts may be seen. The middle and two end rows of bolts pass through the full-length heavy posts. The other two rows of bolts midway between catch the two short posts, not seen. This body is of a type used for hauling silk, except that in this service the steel netting is completely covered with heavy oiled duck which is fastened down all around, so the appearance is radically different although the construction is the same as here shown.

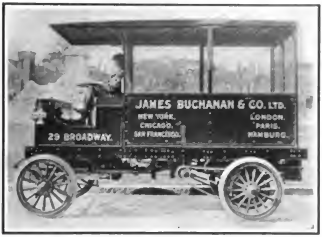

FIG. 12—TRUCK FOR BULKY LOADS

All bolts through wood should have extra large washers under both the head and nut or, with carriage bolts, under the nut. From outward appearance bolting is the preferred method of fastening the slats to the posts, but in reality the slat is a close fit driven in, glued and screwed, care being taken to put the screws in the corners of the intersection. These screws are very deeply countersunk and the holes are plugged so that the screw heads are covered and do not show. Finally, a carriage bolt of small diameter is put through the center of the intersection, making a joint as shown in Fig. 13, which is driven, glued, screwed and bolted. Racking may spoil the tight fit; heat and moisture may render the glue useless, but there still remains a secure joint.

Posts may be fastened to the sills in several ways, varying with the price of the body. Thus, the posts may be tongued or reduced at the ends and the sills grooved, the former being almost a drive fit. The post is then driven in and glued, after which screws or bolts from the outside prevent the post from loosening (see *A*, Fig. 14). Sills on heavy trucks are so wide that the bolts would be excessively long and screws are generally used.

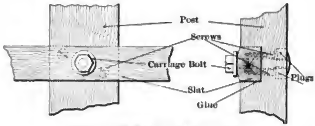

FIG. 13—POST AND SLAT JOINT

Another method consists of cutting a notch into the side of the sill large enough to receive the full-sized post, which is driven in, glued and screwed (as in *B*, Fig. 14). It is much cheaper but has the disadvantage that the sill is weakened without strengthening the construction; that is, the post is not held in as tightly or as strongly, laterally, as in the first construction. The poorest and cheapest method of all is to nail, screw or bolt the post onto the outside of the sill, thus depending on the screws or fastenings alone to hold it in place vertically, horizontally and laterally (*C*, Fig. 14). The sill retains its full strength but the joint has no greater strength than the grip of the screws in the sill. It may be said to the credit of the American manufacturers that few if any bodies are built like this.

Tops may be of several kinds—solid, skeleton or cloth—the last being similar to a cloth touring car top with a wood or metal framework, which can be swung out of the way when desired. These are little used except to cover the driver on trucks without a top and on a few sight-seeing cars. The two other forms are fixed in position and cannot be moved or changed. The solid construction is used mostly on trucks where weight is not so much of an object, while the skeleton form is used on the lighter weight touring or sight-seeing cars and on a

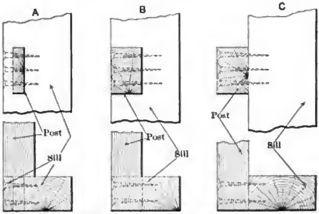

FIG. 14—THREE SILL AND POST JOINTS

few very light trucks. In both forms there is a framework of hard wood, probably oak, upon which the slats are nailed. In the skeleton form the framework is light and shapely. No weight is wasted and the slats are only six or eight in number, not more than 4 inches wide by 3/16 inch thick, so that a space of 8 to 12 inches separates them. The covering will be a fine piece of drilling with probably an ornamental pattern inside, or at least with the inner side of a color to match the upholstering or painting.

In the solid form the framework is heavy and straight instead of shaped. The material of the roof is much heavier, consisting of boards from 6 to 8 inches wide by ¼ to 5/16 inch thick, set edge to edge so as to show a solid appearance. A heavy cover of thick, oiled black duck is stretched over this, rendering the top waterproof. These differences in construction may seem slight, but in a large top, say 6 feet wide by 19 feet long, there may be a difference of 100 pounds in weight between them.

Storm curtains are usually of a more ornamental material than the top, tan duck and various kinds of drilling being used. It is now general practice to put large windows of celluloid in the curtains so that the driver can see plainly to either side as well as in front on rainy days when all curtains are down. An average front curtain measuring 5 feet wide by 5 feet high would have a 20-inch by 30-inch window, the long dimension being across the car. Side curtains, which would be about 4 feet 6 inches long, would have 15-inch by 20-inch windows with the long dimension lengthwise of the truck.

Upholstering, of which there is little except in passenger cars, varies greatly, the principal variation being in the leather. On some of the finer vehicles we find a hand-buffed selected leather, but for ordinary cars machine buffed splits are used. On trucks, where there is so much oil and dirt, pantasote or other imitations are used. These wear well and are appropriate for the character of the work. The lower cost is also an additional item worth considering.

NEW DELIVERY WAGON CONCERN

About November 1 deliveries of Vulcan delivery wagons are to be begun by the Vulcan Motor Vehicle Co., of Pittsburg, which received a Pennsylvania charter in August last. A plant employing about twenty-five men has been started at 7250-7252 Kelly street, East End, and work is progressing on the construction of a number of 14-horsepower and 20-horsepower two and four-cylinder, four-cycle, air-cooled wagons. The organizers of the new company are W. M. and George F. McGonegal, Andrew J. Logan, H. B. Ayres and Charles F. Hochberg, of Pittsburg. The authorized capital stock is $200,000.

The officers and directors of the company are by no means new to the motor car business. Several were connected for some time with the Homewood Automobile Co. and had the agency for Frayer-Miller trucks. W. M. McGonegal, who is at the head of the concern, is said to be one of the best posted and most practical motor men in the state.

The Vulcan wagons are designed and built especially for light delivery work in which speed and economy are prime considerations. The inventors have striven particularly to produce a simple, light, strong and economical machine. Standard motor car construction has been followed in such particulars as float-feed carbureter, jump spark ignition, sliding gear transmission, differential countershaft, cone clutch, side chain final drive, steel channel frame, double-acting brakes on the rear wheels and solid rubber tires. The 1,000-pounds capacity wagon, of 14 horsepower, has 1 3-8 inch square solid forged steel axles, 38 by 2-inch solid front tires, and 40 by 2½-inch rear tires, full elliptic rear and semi-elliptic front springs and is fitted with a closed body 66 inches long, 42 inches wide and 60 inches high inside measurement. It weighs 1,200 pounds.

The other model has a load capacity of 1,800 pounds and is driven by a 20-horsepower engine of the same type as used in the lighter machine, but having four instead of two cylinders, air-cooled. The channel steel frame is 4 inches deep instead of 3 and the axles are 1⅝ inches square, of forged steel. Wheels are of the same diameter as in the smaller machine, but are fitted with 2½-inch front tires and 3-inch rear solids. The weight is 1,400 pounds.

Four wagons of the Vulcan model have been in use by the Joseph Horne Co., of Pittsburg, for nine months, and the company has placed orders for several more.

The prospect for fall and winter sales of wagons by the new company seems excellent. Since Pittsburg merchants began to experiment with the use of light motor vehicles for delivery work about four years ago, the number of such machines has grown to forty at the present time, and notwithstanding the steep hills, sharp turns and rough pavements, it has been found that the up-keep charges for light delivery wagons are less than the cost of maintaining horses to do an equivalent amount of work, while the initial expense is by no means a serious drawback in view of the benefits to be derived in the way of quicker and cleaner deliveries.

We have seen in the past, much money spent by those allied with foreign interests, on the theory that even if the American manufacturer knew what material was right and proper (which was doubtful) and even if he did have this knowledge and chose to use it (which was beyond belief), he would still be met by the insurmountable difficulty of not being able to get in America the proper metals, writes H. E. Coffin, chairman of the Committee on Tests, of the A. L. A. M. Admit, if you like, that in years past, there may have been ground for such statements. It is only natural that in countries such as France, where the motor car first saw commercial progress, that the question of materials should have received early attention. But the above noted theory is now an exploded one. It is my experience that for the season 1909, the American maker knows more in a minute about the quality of the steel in his product than the continental manufacturer does in an hour. Abroad, experiments and tests are made until a grade of material is found that will endure in the place it is desired to use it. This sample is then O. K'd and the steel maker is asked to furnish material according to it. The French designer does not pretend to know the properties, the peculiarities or the chemical analysis of this material; he merely knows that it does his work. The American engineer and frequently the American purchasing agent, must have in his hands all data, physical, chemical and commercial, before an order for any certain material is placed.

MILITARY EXPERTS APPROVE THE MOTOR TRUCK

IN military circles much interest has been expressed in the work of the motor trucks and wagons during the recent maneuvers in Massachusetts, reported in our last issue. Not only were motor vehicles used in the transportation of men and stores but as gun platforms for offensive operations. The accompanying reproductions of snap shots, made during the campaign, show motor trucks carrying rapid-fire guns.

MOTOR TRUCK BATTERY IN THE MASSACHUSETTS MANEUVERS

A Packard truck attached to the Massachusetts or Blue army carried a one-pound Hotchkiss gun into action. In one of the fights when the New York and Connecticut infantry regiments were vigorously attacking the Blues the arrival of the truck with the Hotchkiss gun at a critical moment prevented the theoretical annihilation of the Eighth Massachusetts Regiment. In various other encounters the mobility of the power vehicle was of great tactical value, as the truck could be moved rapidly from point to point so that the single gun commanded as much of the enemy's front as a whole battery of artillery.

It is no exaggeration to say that the performances of the trucks under the very severe weather conditions which prevailed during the greater part of the maneuvers were a revelation to those officers whose experience had hitherto been confined to the mule team. Transportation under the old system has naturally been reduced to an exact science by the U. S. Army. Tables have been worked out giving the distances which can be covered under various conditions and the necessary baggage trains which must be employed to keep an army in condition. When in good physical condition infantry, for instance, can march 15 miles a day, averaging 2½ miles an hour. The necessary division train of horsed vehicles consists of 192 commissary wagons and seventy-two hospital wagons, which are strung out over a distance of 15 miles. To move properly, each wagon requires 60 feet of road space and when hitched to a four-mule team can carry a load weighing 2,500 pounds. Of this load 48 pounds represents the daily allowance of oats and hay for each team.

GUN MOUNTED ON PACKARD TRUCK WITH BLUE ARMY

Substituting, say, a 24-horsepower Packard truck for the horsed vehicle a normal load of 6,000 pounds can be carried at a governed speed of 12 miles an hour, and the machine occupies only 20 feet of road space. In effect, therefore, such a motor truck can transport more than two four-mule teams and travel five times as fast for an unlimited distance. Animal fatigue does not enter into the case at all, as there can be a relay of drivers such as has frequently been employed in long motor vehicle trips, even across the continent. There is also an economy of 100 feet in road space occupied, which would greatly shorten the baggage train and would necessitate the employment of much fewer troops to guard the supplies. The vulnerability of the motor vehicle is, of course, very much less than that of the horsed vehicle. A horse presents a large target for a sharp shooter and when killed not merely diminishes the haulage capacity of the train, but becomes an obstruction that, in a narrow road, for example, must be removed before the following vehicles can make progress. In the case of the motor truck the most serious damage from a rifle bullet would be the perforation of the feed tank or pipes, which could be readily repaired. The loss of the motor truck driver would mean no more in the way of delay than the loss of the driver of a horse-drawn vehicle.

As an instance of the work performed by the motor trucks the service of one of the Packard machines attached to the quartermaster's department of the Red or invading army may be cited. On Tuesday, August 17, when the rainfall was heaviest, this truck carried 6,000 pounds of beef a distance of more than 71 miles, from the headquarters at Fair Haven to a point far to the north of Middleboro, most of the trip being made at night. The roads were very rough and stony, but no external assistance was required at any time to get the machine out of holes. This truck also performed splendid service in carrying heavy loads of baled hay, tents, guns and hospital supplies. At various times it also carried forward numbers of troops who were suffering with swollen feet. Within six days this truck covered more than 422 miles in all kinds of weather.

SOME NOTES ON MOTOR VEHICLE LUBRICATING OILS*

FRANK H. FLOYD

THE important points respecting the use of oils are as follows:

That your cars are all carefully tested before placing them in the hands of the purchaser, and are in first-class working shape.

That it is well to exercise careful judgment in purchasing oils, for their lubrication, that the wear and tear may be prevented.

That oils are usually sold under brands, and mean nothing.

That it is the property tests of an oil that determine its value as a lubricant.

That in analyzing numerous brands of oil on the American market the writer finds that they are strictly hydrocarbon oils, fractional distillates of crude petroleum, but of various specifications.

Fractional distillates are the different portions that are evaporated from crude petroleum by the refiner.

Gasoline, from 68 to 87 gravity, naphtha 58 to 60 gravity, kerosene, 46 to 48 gravity; miners' oils 38 to 49 gravity, light lubricating 33 to 35, medium heavy 22 to 31, heavy oils, 18 to 27 gravity, are fractions. True, oils are treated, filtered, etc., but in the rough they are parts of the crude.

That crude petroleum from different states, different wells, produces lubricating oil of entirely different properties under the same methods of refining. There is a choice.

That hydrocarbon oils employed in gas engine lubrication, are by nature composed of hydrogen and carbon.

That the weight of oil is controlled largely by the amount of carbon in composition. That in practice the heat generated in gas engine cylinders is sufficient to cause all oils to evaporate and burn to a greater or less extent.

That in evaporating, and burning, the hydrogen is driven off by the heat, leaving the carbon to precipitate or pass off with the exhaust.

That there are no oils that will not deposit carbon when they burn, and no oils that will stand the high temperature at the point of explosion without burning.

That water and air cooling keeps the temperature of the metals down to a practical lubricating basis.

That oils of light weight (high gravity) contain less carbon in composition than oils of low gravity (heavy weight) and will deposit less when they burn.

That the evaporative or flash test, and the burn test of an oil is important to consider in conjuction with gravity.

That high, evaporative test and light-weight oils, will be less affected by the cylinder heat and will deposit less carbon when they burn. The desideratum.

That the viscosity or body test of an oil should be considered in transmission and in lubricating journals and shafting in the crank case, but in cylinder lubrication it is impossible to refine high gravity, high evaporative test oils with little body.

If both are high, the body test will take care of itself.

That high-grade gas engine oils are filtered to lessen the carbon and the gravity is raised, and the weight reduced as well as the viscosity, but the fire test is not affected.

That the various colors of oil are due to the bleaching effect of the filtering medium.

That color alone is not an index in determining a good gas engine oil.

That the cold or fluid test is important to consider at low temperatures.

That manufacturers will do well to regulate the temperature of oil in the receiver to get a uniform flow in all seasons, and not necessitate a change in the specifications of the oil.

That finally, a good gas engine oil is one of high gravity (light weight) with a maximum high evaporative test, and a fluid oil at low temperatures.

That there are limitations in refining oils from high-grade crude.

That you should consider all of the property tests of an oil in purchasing and not pick out one as an index.

I think the foregoing covers much that can be said about gas-engine oils.

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*A paper read before the summer meeting of the Society of **Automobile Engineers, in Chicago.**

NEW BALTIMORE CAB SERVICE

A new taxicab service was started in Baltimore about the middle of September, with twenty-five machines in operation. Harry L. Stewart, proprietor of the Stewart Central Stables, is at the head of the project and says that $80,000 has already been spent in getting it started. Mr. Stewart's stables on West Eager street have been converted into a garage for the care of some of the taxicabs, the rest being housed at 211 Park avenue, which has been Mr. Stewart's headquarters.

The machines adopted are those of the American Locomotive Co. and are fitted with royal blue bodies while the running gears are red. The taximeters are driven by the front wheels so that slippage of the driving wheels on wet or icy pavements will not run up the mileage and fare beyond the distance actually traversed. The service is quite popular.

The Commercial Vehicle

Vol. IV October 1909 No. 10

Published Monthly by The Commercial Vehicle, Incorporated, at
1402 Broadway, New York City

Cable Address
Comveh, New York

Long Distance Telephone
425 38th Street, New York

H. F. Donaldson, President and Editor
H. W. Perry, Associate

Advertising Department
Warner S. Young

Subscription Rates

United States, Canada and Mexico . . . . One Year $2.00
Other Countries in Postal Union . . . One Year $3.00

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Entered as second-class matter, September 13, 1906, at the post office, New York, N. Y., under the Act of Congress of March 3, 1879.

FRENCH TRIALS THIS MONTH

How much of the lead which France secured abroad in the reputation for motor vehicle production is to be credited to mechanical excellence and how much to clever methods of exploitation would, perhaps, be difficult to determine. Certain it is, however, that the genius early displayed by the French for the successful conduct of contests of all sorts had a great deal to do with the lead secured by that country in general public estimation. Under the stimulus of public competition motor vehicle manufacturers in France developed the motor vehicle with amazing rapidity, at a rate in fact that had never been approached in the case of other engineering constructions. It took a lifetime or more to develop the locomotive, and longer to produce the steam vessel of such design as is common to-day, and even in the electrical field, in which development was much more rapid, the rate of improvement was very much slower than in the case of the motor vehicle.

French makers of commercial vehicles are evidently profiting by the example set them by the pleasure car builders, for it is their intention to hold another series of thorough trials of work vehicles during the latter part of the present month and the beginning of next. The trials are to be held under the official supervision of the Automobile Club of France, the foremost organization of its kind in Europe, and the National Government is extending its support through the participation of the War Department in the trials. It has gone further than this and has announced a schedule of which subsidies which are to be paid to owners of vehicles of such types as the French military authorities approve.

Although the commercial and military trials will be held jointly a separate set of regulations will govern the build and performance of the vehicles taking part in both competitions. The vehicles participating will be divided into three classes; motor trucks, road trains and omnibuses. The truck class will contain a number of subdivisions, covering all sorts of commercial vehicles carrying loads of less than 1,000 pounds to upward of 6,000 pounds. The road train classification will include tractors, complete trains with trailers for transporting freight, and trains with trailers for carrying passengers. Omnibuses also will be grouped in separate classes, including those carrying six to ten passengers, those carrying eleven to twenty passengers and 'buses with capacity for more than twenty passengers.

Extensive preparations have been made for the holding of the trials. Headquarters will be at Versailles, a few miles out of Paris, where a huge shed has been built as a central garage for the competing machines. Complete arrangements have been made for the fueling and cleaning of the competing vehicles, and for the lighting, heating and office equipment of the headquarters building. In fact the advance reports from our French correspondent show that every detail that would make for the efficient conduct of the trials has been considered in the most practical manner.

On Monday, October 18, the trials will commence, the daily schedule calling for journeys in the neighboring country of about 100 miles, out and back. The routes have been laid out so that the competing machines will have to pass over all sorts of road surfaces and climb grades the steepest of which is more than 10 per cent. On the third day of the trials a long journey is to be made, in stages, to Clermont-Ferrand, in the central part of France, where the machines will be placed on exhibition for a day before returning again to Versailles.

Machines entered for the War Department trials will be required to operate under military conditions, being sent out in regular convoys to travel at such rates as the army officers may direct and to keep regular distances apart when in motion. The Government is prepared to made an agreement with the purchaser of each approved machine so that it can be acquired by the military authorities, at a price, in time of war. The purchaser who makes this agreement can claim a subsidy of $600 from the Government upon buying the vehicle from the maker and in addition an allowance of $200 a year for three years thereafter.

More than fifty entries had been made by the middle of last month, including vehicles from the following establishments: Aries, Berna, Berliet, Clement, Cohendet, De Dion, Delaugere & Clayette, Desmarais & Morane, Krieger, Lorraine-Dietrich, Malicet & Blin, Peugeot, Panhard-Levassor, Sauer, Société Française de Constructions Automobile, Vinot & Deguingand.

* * *

ARMY TRIALS IN AMERICA

In view of the success of the motor trucks in the recent army maneuvers in Massachusetts, as related in the September number, and of the forthcoming French military trials, to which attention is called in this issue, the question arises if the time is not approaching when a series of similar trials might be held with advantage in this country.

There is no reason for believing that the machines built in the United States would not go through such tests with satisfaction to the army officers and credit to themselves, and a successful demonstration of the adaptability of the self-propelled vehicle to various army purposes should open the way for a large business in supplying the needs of the army in this direction. Among the types of vehicles that are particularly suited for army purposes are the ambulance, the truck for transporting quick-firing light artillery and signalling and wireless outfits for the signal corps, traction engines for hauling wagon trains of provisions, tents, ammunition and so on, officers' light cars, motorcycles for scouts and sharpshooters and motor stages for hurrying small bodies of men to strategic positions.

Co-operation of the army would be required, of course, to carry out such trials, and it is not at all likely that any such subsidy plan as that fathered by the French War Department could be invoked to lend encouragement to the undertaking. However, the army has already shown its interest in the motor vehicle for army work and the stake is great enough to warrant some serious efforts on the part of the makers.

REPEAT ORDERS

Every seller of motor trucks and delivery wagons in the City of New York knows the story of the downfall of one of the pioneer truck agents of the city who in early days introduced a large number of trucks among local merchants and manufacturers and gained a big lead in the field. The failure of this agent had a serious influence also on the business of the manufacturers of the vehicles, which was practically suspended for a time and eventually changed ownership and underwent reorganization.

The consequences reached far beyond the immediate seller and maker; they affected the whole commercial vehicle situation in the first city of the country by prejudicing many of the leading commercial and manufacturing concerns of the Metropolis against the self-propelled business wagon, and this prejudice is only with difficulty now being overcome.

The chief cause of all of this trouble was overstatement on the part of the agent of the capabilities of the machines he was selling; he made positive claims regarding capacity, economy and durability which, in practice, were quickly proved to be erroneous.

While this exceedingly bad start has been the bane of nearly all commercial vehicle builders and agents who have since then attempted to place their machines in New York, and even other large cities, the preponderance of effect may in the end be for the good of the industry. Each agent has learned a most important lesson from this early failure and has applied it to his own business. He has learned, and has tried to impress it upon the manufacturer whom he represents, that the commercial vehicle business is not of the "get-rich-quick" order; that the only road to permanent success in the field is the fairest possible treatment of the customer, and that the best foundation for growth is the satisfied user. The machines must do all, and more, than is claimed for them; they must be built conscientiously and sold with a view to making a profit on the first cost of the installation and not on subsequent charges for repairs and maintenance.

Repeat orders are the best proof of the quality of any given make of machines. They come from customers who have used the machines; from the man who knows by experience what the machines will do and is satisfied with them. Such a user is the best asset a truck builder and his agent can have; upon the number of such users depends the future of the establishment represented.

It is in repeat orders that broad-gauge men identified with the industry base their confident expectations of an enormous business in commercial vehicles in the years to come—a business that shall not be ephemeral or dependent in any degree upon the whim of pleasure-seeking individuals, but which shall be as permanent as the commercial activity of the community itself.

Magnitude of the industry will be commensurate with the volume of business done in the country. Repeat orders frequently are for a dozen machines; sometimes for thirty, and in time will be for fifty and 100 lots. This fact is already apparent in the taxicab business, where new services start with twenty-five, fifty or 100 motor cabs and within a few months are augmented by repeat orders of even larger size. From time to time there are being chronicled in the pages of THE COMMERCIAL VEHICLE reports of repeat orders of importance by large users. Just as we go to press with this issue we learn that R. H. Macy & Co. have placed an order for a dozen new electric delivery wagons after having used more than three dozen for a year or two and a smaller number for a longer period. The Adams and American express companies also are placing repeat orders for both gasoline and electric wagons, the Adams company now having in service half a hundred motor wagons in New York City alone. James A. Hearn & Son, dry goods merchants, who have more than forty machines in use, have been constantly adding to their equipment ever since they first experimented with motor delivery nearly ten years ago. The Anheuser-Busch Brewing Company in St. Louis has also built up a service of more than fifty beer trucks and wagons, many of which are of the same make consisting largely of two or three makes for which frequent repeat orders have been and continue to be given.

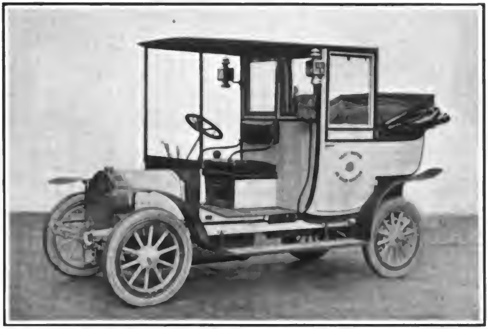
It may almost be stated that the repeat order is the keynote to success in the commercial vehicle field. A first installation, if successful and backed by honest and courteous treatment of the customer, in very many cases leads to repeat orders many times larger than the original order. Not only this, but the frequent reordering of one user from the same builder is not lost on other merchants.

* * *

John N. Willys, president of the Overland Automobile Company, returning home after a two months' tour in Europe, was interviewed last month: "One of the most interesting things to my mind was the great progress that has been made in commercial vehicles," he said. "The last five years has made wonderful changes in traffic conditions abroad, and it is hardly conceivable that it was possible in that short time to supplant so many horse drawn vehicles with motor driven machines, particularly in London and Paris, where the motor cab is crowding the horse drawn rig. There are hundreds of motor 'buses, most of them double-deckers, although future ones will have one deck only so as to handle easier. Paris, London and other large centers on the Continent are fairly alive with taxicabs. While New York, Boston, Chicago and other American cities are using a great number of taxicabs, the quantities being used in this country cannot be compared to those used in European centers."

AMERICAN MODEL DE DION TAXICABS

In addition to filling an order for 250 taxicabs for the New York Transportation Co., the De Dion-Bouton Selling Branch, in New York, has made arrangements with the factory in France whereby it is enabled to supply 1,000 taxicab chassis to the American market during the present year. There are thousands of De Dion taxis in service in the capitals and other large cities of Europe, and the French factory has had more experience in the building of motor cabs and light cars than any other concern in existence. It is now manufacturing a one-cylinder 9-horsepower cab, a two-cylinder 10-horsepower, a four-cylinder 12-horsepower and a four-cylinder 14-horsepower chassis model. The chassis which are now being brought in for the New York Transportation Co. are especially built for American work, with the steering post and control levers on the left and with other changes that suit them better for service in this country. They are of the 14-horsepower type. The bodies are being built in America, and the first lot of machines will be on the streets in October. In wholesale quantities this same model is being offered at the price of the 12-horsepower model.



TYPE OF DE DION TAXICAB NOW BEING MARKETED IN AMERICA

The overall length of the cab, with a body like that shown in the accompanying photograph, is 142¾ inches, on a wheelbase of 109½ inches. The frame of the chassis is 39 inches wide and the wheel tread 54½ inches. The body-building length, back of the dash, is 97¼ inches. From the dash to the front of the rear wheels measures 62⅝ inches, giving ample room for doors and easy entrance to the driver's seat. When loaded, the top of the chassis stands 22¾ inches above the ground. Wheels of 32 inches diameter are used and are fitted with 4-inch pneumatic tires. The chassis has a turning diameter of 26 feet and weighs 1,650 pounds.

The engine is a De Dion-Bouton, with cylinders cast in pairs and a bore of 3 inches and stroke of 4¾. All valves are mechanically operated from a single camshaft. Ignition is by high-tension Bosch or Nilmelior magneto, as desired. The carbureter is of the automatic regulation type, and fuel consumption is at the rate of about one gallon to every fifteen miles traveled. A centrifugal pump circulates the cooling water and a fan draws a current of air through the radiator in front. Lubrication is by a mechanically driven pump that sends the oil to all bearings under a pressure of about 25 pounds per square inch, and oil which drips from the bearings falls on a strainer that separates the crankcase from the double-bottom tank and filters the oil. From this tank the oil is again forced to all bearings of the engine. The tank holds one gallon, sufficient for 400 miles of work. Thus, the lubrication system insures a constant and economical flow of oil that keeps the motor in the best condition without any attention from the driver.

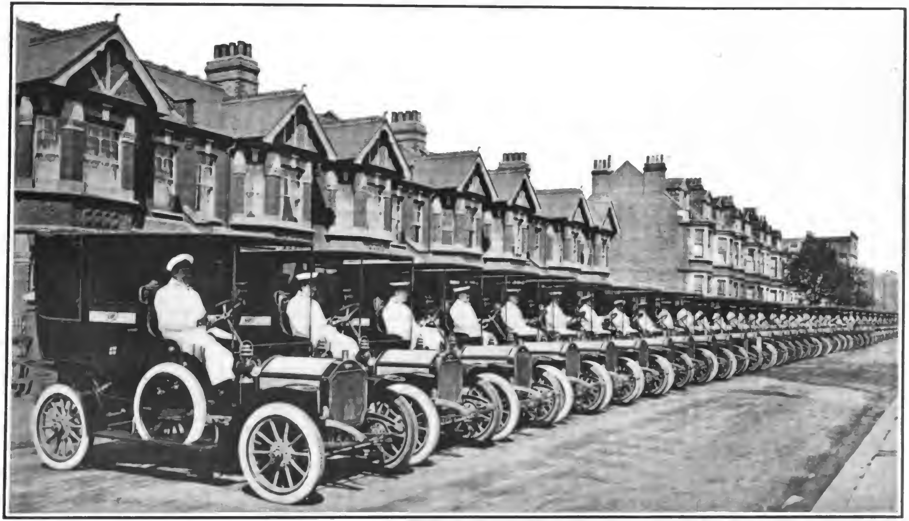
A De Dion three-plate disc clutch, in which steel surfaces are in contact with bronze, is used. It requires no lubrication, cannot burn out and takes hold gradually, thereby preventing jerky starts and the breakages that sometimes result from a clutch that grips too "fiercely."

Three forward speed ratios and one reverse are afforded by a selective type sliding-gear transmission in which the parallel shafts lie in a horizontal plane. Direct drive is on high speed.

The rear axle construction is peculiar to the De Dion cars. The entire load is carried on a stationary axle while the driving power is transmitted through two transverse jointed shafts, which are absolutely distinct from the weight carrying axle, and, being flexible, can adjust themselves to movements of the frame in relation to the axle without binding.

The chassis is guaranteed free from defects, either of materials or workmanship, for a period of one year.

Washington motorists are worked up over the announcement that the District Commissioners are formulating drastic regulations regarding exhaust from motors and unnecessary noises from motor vehicles.



PHOTOGRAPH MADE IN LONDON OF PART OF THE FLEET OF NAPIER MOTOR CABS OPERATED BY THE COUPÉ COMPANY IN PUBLIC SERVICE

A FLEET OF BRITISH TAXICABS

As a good illustration of the fact that the British financier is still actively interested in the taxicab, the accompanying engraving will serve very well. This view shows only a small portion of a fleet of 2,000 Napier taxicabs which have been sold by S. F. Edge, Ltd., to the Coupé Company, of Regent street, London, which concern also runs an extensive motor livery department, already discussed in this paper. These particular taxicabs are all operated and driven by British drivers, and every part of the vehicle is British as well—tires, chassis, body.

Some 2,000 more Napier taxicabs are being put into London service by Messrs. W. & G. Du Cros, a separate firm from the Coupé Company, but whose cabs resemble the vehicles of the former concern; they are, however, distinguished by a brass initial of W. & G. on the radiator.

The illustration is of particular interest in the matter of showing that although the French make of cab has held sway in London for many years, the British vehicle is proving itself at least equal to any other make. It is reported that an American order for 1,200 Napier cabs has been booked.

TRADE SITUATION IN BALTIMORE, MARYLAND

A. ROBERT FRENCH

THE city of Baltimore is still in its infancy so far as motor vehicles for commercial purposes are concerned. There are just three reasons why this is the case. First of these is the thorough conservatism of the merchants and other inhabitants; second, the rough cobblestones which for the most part constitute the paving material of a majority of the streets, and third, the tremendous hills for which the city is noted. During the past year or so there has been some indication that the conservatism of the citizens is about to give way to the persistent progress of motor vehicles, and this, together with the fact that steps have been taken for improving the streets with various smooth and up-to-date materials, would indicate a good future for the commercial motor vehicles here. In other words, it seems that the motto that has always characterized doings in Baltimore, "slow to begin, but always there at the finish," will be fulfilled in this particular matter.

OUTLOOK FOR THE FUTURE

Some idea of just what the future has in store for the merchants of Baltimore who are desirous of using motor vehicles in place of horse-drawn vehicles for commercial work, as well as for the manufacturers of this type of horseless vehicles, can be had by telling what the city and State have recently done for the improvement of the highways. The General Assembly of Maryland has passed an enabling act permitting the city officials to submit to the citzens of Baltimore for their approval a $5,000,000 paving loan, the passing of which seems certain. This will mean the vast improvement of Baltimore's streets and the doom to a great extent of the rough cobblestones which have been an eyesore to residents and visitors alike for years. Furthermore, a $2,000,000 annex paving loan, which was favorably voted upon, has already resulted in the improvement of the outlying streets of the city and the transforming of them into favorite thoroughfares for motorists. At its last session the State Legislature passed a $5,000,000 appropriation for good roads in the State, and already the roads to be benefited by the expenditure of this amount have been selected by the Good Roads Commission and some of the contracts for the work have been let. Of this amount Baltimore city will be benefited to the extent of $1,000,000, for that sum has been set aside for the improvement of the toll roads leading out of the city, but which are within the limits of the municipality. A recent statement by Col. Sherlock Swann, president of the Board of Police Commissioners, and also a member of the State Motor Car Commission, will demonstrate what a bright future Baltimore's citizens think the city has in the motor commercial line.

POLICE COMMISSIONER'S VIEWS

"I believe that within a few years," said the Colonel, "practically all transportation in Baltimore will be carried on by means of motor vehicles. There is every reason why it should be so. Many of our hills are too steep for horses with heavily loaded wagons, but most any of them can be pulled by motor cars, especially after the paving improvements. Some of the wholesale houses have already tried the motor vehicles for transporting goods with success. Some motor car concerns turn out nothing but freight machines, and I believe that is an indication that the people are going to take them up."

The municipal departments have made the most progress recently in the commercial vehicle line. The first of these departments to introduce the motor car was the Park Board, which has a wagon for inspection purposes. Then the Police Department placed an electric patrol in service in the Central district in place of the horse-drawn patrol. After service of a little more than a year it was replaced by the present 60-horsepower locomobile patrol. The old electric patrol has just been turned over to the Street Cleaning Department for conveying the white wings to and from work. Then the Fire Department got busy and purchased two White steamer chief wagons, one for Chief Horton and the other for Deputy Chief Emrich. They have proven such time savers in responding to big fires that the Fire Commissioners have been considering the practicability of testing a horseless fire engine and hose carriage. The latest addition to the city's motor car force is the Police Marshal's inspection wagon, a 30-horse power Locomobile, which will be delivered within a week or so.

The Postoffice Department tried out electric wagons for mail collection purposes, three cars being used altogether, but after an ample test they did not measure up to requirements and were replaced by the horse drawn carts. There has been no move on the part of the postal officials thus far to resort to a more up-to-date method of collection service.

MACHINES IN VARIOUS TRADES

In the wholesale line there are seven trucks in operation for the delivery of goods. Five of these are used by the Baltimore Bargain House, which is engaged in the wholesale merchandise trade, and they have given great satisfaction. They replace about three times as many horse drawn trucks. The other trucks are used for wholesale purposes by the Crown Cork and Seal Company and the Chattolanee Spring Water Company. Shapp & Dohme, wholesale druggists, have a delivery wagon in service which does as much work as fully three horse-drawn wagons, while in the retail line, the department stores of Joel Gutman and Hutzler Brothers cover the same amount of territory in delivering goods with their motor delivery wagons as was formerly allotted to five horse-drawn wagons. Gutman's delivery wagon is an electric, while Hutzler's is a gasoline vehicle.

Taxicabs have also entered the commercial circles of Baltimore and the service seems to improve daily. The company operating these machines is known as The Taxicab Company of Baltimore City, with headquarters on Eager street, between Charles and Cathedral streets. The company started with two cabs, but it was soon necessary to increase this number, until now there are more than a dozen to be seen about the streets of the city. The rates for these vehicles are as follows:

Tariff No. 1 (from one to three passengers), for the first half mile or fraction, 30 cents. Each quarter of a mile thereafter, 10 cents, and each six minutes waiting, 10 cents.

Tariff No. 2 (four or five passengers), first one-third of a mile or fraction, 30 cents. Each one-sixth of a mile thereafter, 10 cents, and each six minutes waiting, 10 cents. The extra charge includes 20 cents for each package or small trunk carried outside, while all of the tolls are to be paid for by the passengers. The rates for shopping and calling are $1 per hour—waiting time only

PROGRESS MADE IN INDIA RUBBER CULTIVATION

THE enormously increased use of rubber for the manufacture of motor vehicle tires, and in other industrial work, has caused a good deal of apprehension as to the extent of what might be called the reserve of wild rubber production. Should the demand permanently increase beyond the possible supplies the situation would be a very serious one, for up to the present there has been no effective substitute for rubber discovered or invented, so far as the making of tires is concerned. It is encouraging to learn, therefore, that a large industry is being developed in the cultivation of rubber, just as one might cultivate coffee or orange trees.

A correspondent of the London *Mail* points out that practically no cultivated rubber came to the European market prior to 1903, when a few tons were obtained from Ceylon and Malaya. In 1908 the delivery of cultivated rubber from all sources was about 2,000 tons. Early in that year, owing to the financial disturbances in the United States, the price of cultivated Para rubber fell to 68 cents a pound, but it has since risen steadily and now averages $1.50. As in most cases the cost of the cultivated article is only 37 cents a pound, including all charges, it will be seen that the companies which have embarked in the industry are making notable profits.

As things are, the supply of rubber, whether wild or cultivated, scarcely keeps pace with the demand, but of course over-production may recur for a brief period at any moment. It is unlikely, however, that the share contributed by cultivated rubber will affect appreciably the aggregate output, since it is only about 5 per cent. of the world's production, over 60 per cent. of which is wild rubber from Brazil, while about 20 per cent. is African rubber. The effect of a "slump" would be felt by wild rather than by cultivated rubber, owing to the difference in the cost of bringing them to market. After all charges, including freight, have been allowed for, cultivated rubber, as we have said, can be produced at 37 cents a pound, whereas wild rubber from Brazil, owing to the difficulty of collecting it and the existence of a large export duty, costs 75 cents a pound to bring to market, and every year the cost is increasing owing to the careless tapping, the consequent destruction of trees, and resultant necessity of penetrating further and further into the interior of the forests. As for the wild rubber forwarded from the west coast of Africa, this is of inferior quality, while the methods of collecting employed there are even more wasteful. It follows that should the price of rubber fall to 75 cents a pound wild rubber will hardly pay its way, whereas cultivated rubber, which always commands a higher price on account of its greater purity, will still be showing a profit of 100 per cent. It should also be borne in mind that rubber is increasingly used in many industries, and that could its price be lowered it would be recognized as one of the finest paving and flooring materials. The courtyard of one of the best known hotels in London is laid, we are told, with rubber, which has not been renewed for over four years, yet, notwithstanding the enormous traffic, it shows no signs of wear.

There are it seems at present in the Malay Peninsula, Ceylon, Borneo, Sumatra, Java, etc., some 300 companies engaged in the cultivation of rubber. The best results have been forthcoming from the Federated Malay States, where the average dividend for 1908 of eight principal companies was over 50 per cent. About equally promising is the outlook in Sumatra and Java. So much for the roseate side of the prospects of the rubber industry. We must, on the other hand, keep in view the fact that besides the possibility of overproduction there are three possibilities that have to be considered before embarking in the rubber industry. One is that the trees may become diseased. Another is that a commercially efficient substitute for rubber may be invented. Lastly, a process of prolonging the life of manufactured rubber may be discovered. Touching these objections it may be said that so far as has been ascertained rubber trees are immune from disease, and that notwithstanding great and repeated efforts science thus far has failed to invent an artificial equivalent, or to discover a process of increasing the durability of rubber in the manufactured state.

An inch in four years is the swiftest growth known in the race of the trees. Farmers and fruit growers are said to have no reliable unit rule to govern them in knowing how long it takes for a tree to grow an inch, but some carriage makers have found out, says the Chicago *Tribune*. They asked about forty of the country's prominent vehicle and wheel manufacturers drawing their stock from territory where hickory, white oak, ash and tulip trees grow to select and express to them short cross sections of these woods from the odds and ends about their shops. These were to be selected for the average width of growth, and the size of each block was to be about one inch lengthwise, one inch across and a fourth of an inch thick. They examined these blocks carefully and marked on each block a one-inch space across the average size of growths of the annular rings. They then counted the number of rings within the inch space on each block and registered the total in ink thereon. Then they counted these totals on all the samples of each of the several kinds of timber submitted and in the usual way thus ascertained the average number of years required for each kind of tree to grow an inch. An inch growth on one side represented, of course, two inches growth to the tree. They submitted the count, process and result to unquestionable scientific authority. Their general conclusion was that it takes from four to five years for a tree to increase one inch in diameter.

DIVIDEND DECLARED BY LONDON OMNIBUS COMPANY

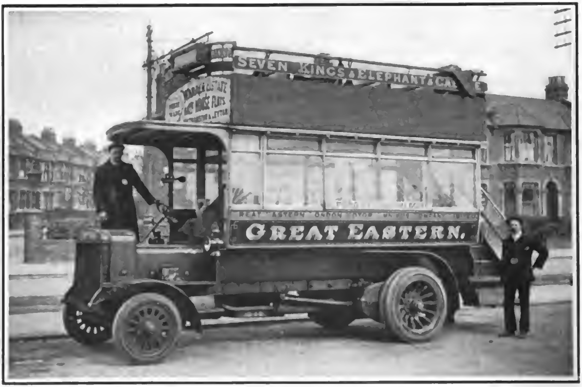
READERS will note with renewed interest that in spite of all the ink and space which has been expended on abusing the London motor 'bus and lamenting the "lost" capital which has been invested in it, this particular type of conveyance, as the writer has always maintained, is quite capable of not only serving the public well, but of earning a dividend for its owners. For fresh proof of this we may again turn to the accounts of the Great Eastern London Motor Omnibus Co., Ltd., up to June 30 last, which are now available for publication.

The surplus on the year's business which is carried to profit and loss account is $76,825, from which the director's fees and other charges take $6,005, leaving $70,820. The directors recommend the following distribution of the balance: depreciation on 'buses, $32,500; depreciation on property and tools, $750; written off as preliminary expenses, $5,000; to insurance fund, $5,000, this leaving a balance for disposal amounting to $27,565, to which must be added $10,350, this making the total amount available for disposal $37,915. A dividend of 5 per cent will absorb $24,620, leaving $12,295 to be carried forward.

In concluding this highly creditable record the writer is of opinion that he cannot do better than quote from our English contemporary "The Commercial Motor" which with reference to the Great Eastern achievement very truly remarks: "We have here the case of a strongly opposed and cordially hated all-motor undertaking; it started without experience to guide it, and it has survived the combined adverse effects of competition from rate-aided electric tramcars, superfluous number of rival motorbuses, and a keenly managed group of underground connections. The survival, had nothing else been demonstrated, is an achievement with which the chairman of the company and his co-directors may permissibly be gratified. They have come through a year of exceptional difficulty and bad weather, to say nothing of abnormal road upheavals along some of their routes with a plus margin of £15,365 between working expenditure and income."

The Great Eastern Co. employs fifty Straker-Squire 'buses and twenty-five Arrol-Johnstons, one of the latter being illustrated herewith. Seventy vehicles are generally kept in service, and are as good to-day as when they first went on the road.

TURNER.



ONE OF THE ARROL-JOHNSTON MOTOR 'BUSES OPERATED BY THE GREAT EASTERN COMPANY

Motor patrol wagons have recently been bought by or delivered to the cities of Hartford, Conn.; Baltimore, Md.; Indianapolis, Ind.; Minneapolis, Minn., and San Francisco, Cal.

In America the tremendous importance of heat treatment of steel has been grasped and the principles involved therein carried to an ultimate conclusion. Intelligent heat treatment is quite as essential as the quality of steel; a commonplace steel may be given very good physical qualities by proper heat treatment, and the best of steel can be ruined by lack of it. There must be thoroughness in the various operations of annealing, hardening and tempering. Treatment carried on with sufficient care makes uniformity of product possible. How necessary this is in important drop forgings is obvious.

The Commercial Vehicle

Vol. IV November 1909 No. 11

ELECTRIC VEHICLE SITUATION IN BOSTON, MASS.

Discussion of the Causes which Have Retarded the Growth of Electric Vehicle Equipment—Present Appreciation of the Machine and Promise of Tremendous Future Development--Users' Experiences

C. F. MARDEN

AFTER a long period of comparative indifference to the electrically propelled motor vehicle, Boston is experiencing a revival of interest in this type that promises to give the electric truck and pleasure carriage their proper place in the business and social life of the community. It has been a constant source of amazement to people interested in the electric vehicle, and who were familiar with its popularity elsewhere, why there were so very few on the streets of Boston and its neighboring municipalities, a territory considered almost ideal for their operation. With miles of narrow, congested business streets, where space is always at a premium, it has seemed to strangers that the conditions demanded the wide use of electrics, and they have marvelled that the slow-moving, noisy and cumbrous horse-drawn vans have been permitted to survive so long. And when they have seen the fine, level avenues radiating from the city proper to the immediate suburbs, and the beautiful boulevard-like thoroughfares leading to the communities on the outer rim of the Metropolitan district, they have mar-

GENERAL VEHICLE CO.'S ELECTRIC WAGON OPERATED BY PAINE FURNITURE CO. OF BOSTON velled still more that electrically driven trucks were so scarce.

To explain this apparent indifference, even in the face of a steady-increasing recognition of the availability and value of motor-driven vehicles for commerical purposes, has been a difficult task for the local motorists. They could not tell why Boston seemed so tardy in taking up electric trucks and in their general use, but the fact remained that it was about the hardest task that a salesman could undertake to persuade a business man to install an electric truck. Even though he was well convinced that his business would be benefitted by the introduction of a self-propelled truck of some sort, he had to be convinced all over again that an electric vehicle was the best for his needs. That feeling, conservatism perhaps, seems to be wearing away, however, and with the excellent work that is being done by the trucks in service, the good results from improved motors and batteries, an old but almost virgin field, and an extremely rich one, is being opened up for the manufacturers of electric vehicles.

BOSTON'S EARLY EXPERIENCES

The apathy in the matter of electric vehicles doubtless dates back to Boston's early experience with them. Very early in the history of commerical motoring a large company was formed in Boston. Many people became interested in it and there was confident expectation that transportation of passengers and freight through the streets was at once to be revolutionized. This company installed a large number of cabs and delivery wagons and started into the business of providing electric automobile service on a large scale. A cab system was established and many of the large stores took up the electric delivery wagon service, and at that time probably Boston had as many electrically propelled vehicles on its streets as any city in the country. But the time was not ripe. The expense of maintaining the equipment proved higher than had been anticipated and the concern came to a disastrous end, giving the electric vehicle in Boston a setback from which it is only now recovering. That experience created distrust in the electric that has taken a long time to remove. While gasoline vehicles made steady and rapid progress the electric stood almost still, and for a long series of years it was next to impossible for the agents of electric cars to dispose of them in any numbers to customers.

Another factor that discouraged the introduction on a large scale of electrically-propelled vehicles was the price of electric current. The Edison company has a practical monopoly of the manufacture and distribution of current for lighting and power purposes in Boston and formerly its rates were so high that the purchaser of an electric car or delivery wagon found it a most expensive proceeding to keep his batteries charged. The company, moreover, seemed to take little interest in encouraging the use of electric vehicles. There was a hard and fast price list from which it was very difficult to secure concessions and it was a risky proceeding to venture upon the electric vehicle business unless upon a larger scale than was warranted by the development of the vehicles themselves and of their batteries.

EDISON COMPANY'S ATTITUDE

Recently, however, the Edison company has taken quite a different attitude and nothing perhaps has contributed more to bring the electric truck to the favorable attention of the business men of Boston than the reductions that have been made in the price of electricity by the Edison company. A few years ago the price of electricity was eighteen cents per unit and even when a concern or an individual used a large quantity it was not an easy matter to secure a lower rate. This fact and the large consumption of current by the batteries then in use made the expense of operation so high that it counteracted to a very large extent the advantages possessed by electric vehicles. Few business men could see any chance for profit by the installation of electrics and so very few were introduced. Later the cost per unit of electric current was reduced to fifteen cents with lower rates that could be earned by increasing the total of current consumed. Only a short time ago the cost per unit was reduced to twelve cents maximum with a scale of prices ranging downward, that made electricity much more available for all purposes and brought it within profitable reach for vehicles.

FRONT OF BOSTON ELECTRIC VEHICLE GARAGE

With twelve cents per kilowatt hour as the maximum price of current it is possible for a concern which uses a large quantity of current for lighting and power purposes to obtain the current necessary for charging the batteries of its vehicles at between three and four cents per unit, a rate that is considered decidedly favorable for the operation of trucks and delivery wagons. Having attained a position where it was able to provide electric current for vehicle batteries at a low rate the Edison company has given more atteention to the matter in educating the public than it has for some years. Its last previous effort in this direction was several years ago when it established charging stations all over its territory, and did much to make them known to the users of electric carriages and commercial vehicles. The time had not arrived, however, for the common use of electrics, and the elaborate system of stations had little patronage. The company is now again devoting attention to a campaign of education in the possibilities of electrics and has done much to assist in their favorable recognition by merchants of the city. As the Edison company's territory covers all of Boston and many surrounding towns and cities it is in a position to give excellent service in the way of charging batteries. It has encouraged meetings of electric vehicle salesmen and users, battery men and others and has promoted publicity as to the advantages of electricity for pleasure carriages and business wagons. This campaign has shown many doubters that it is possible with modern improved batteries to use electrically driven delivery wagons and trucks at comparatively small cost for introduction and maintenance; that providing they introduce a considerable number of vehicles, or are large users of electricity for other purposes, they may secure the necessary current for charging the batteries at low cost.

ACTIVITY AMONG VEHICLE BUILDERS

Seeing the signs of the times some of the manufacturers of electric vehicles have put hustling agents in charge of their product, men whose attention is not diverted by the necessity of giving the major share of their time to the comparatively easy sale of gasoline pleasure vehicles, and who have gone at the promotion of interest in the electric vehicle among business men in a most energetic manner. These men have joined with the officials of the electricity producing company, with the agents of battery companies and with others interested in the subject, have organized an association that holds frequent meetings for the discussion of subjects related to the promotion of the electric vehicle business, and even have published a periodical devoted to the interests of electrically propelled vehicles. And the results of all this work are beginning to show in a greatly heightened interest among the commercial vehicle-using public.

ELECTRIC DELIVERY WAGONS USED BY THE CHRISTIAN SCIENCE MONITOR IN BOSTON

One most interesting and significant sign of the rise in popularity of the electric vehicle in Boston, and a sign which the people interested consider most gratifying, is the opening recently of a large garage, built and equipped solely for the purpose of storing, charging and caring for eleectrically propelled vehicles. This is the Boston Electric Garage company's new building at 321 and 323 Columbus avenue. N. Rommelfanger is president of the company and James Binney treasurer. Mr. Rommelfanger is an electrician, who was trained in his profession in Germany and who spent fifteen years in the service of the Edison company in Boston. Recently he has been in business for himself and is considered an expert in electric vehicles and batteries. Mr. Binney has had much experience in the automobile trade in Boston. The new garage, which is equipped with every facility for handling electrics is conveniently situated, being only a short distance from the business center of the city. It has four stories and basement connected by an automobile elevator and a large amount of storage room with convenient arrangements for charging and repairs on vehicles and batteries. The garage is also the headquarters for the Detroit electrics the local agency for which is held by the garage company.

GARAGE FACILITIES FOR ELECTRICS

Nearly all the newer garages are providing facilities for the storage and charging of electrics and recently the manager of one of the large stables in the city equipped one floor of his stable exclusively for electric trucks and pleasure carriages. Under the name of The Metropolitan Electric Garage this concern is making a bid for the storage, care and charging of vehicles, paying special attention to the charging of business and pleasure vehicles used in the down-town section. It is said that the managers of some of the other large down-town stables who have seen their profits in danger of being eliminated by the introduction of motor vehicles, are also preparing to cater to the electric vehicle business and are putting in charging plants for the regular charging of vehicles or for giving a "boost" to vehicles which are kept elsewhere. These stables, being users of considerable electricity for other purposes, are able to provide current for charging at a very reasonable rate.

Since its advent in Boston the General Vehicle Company, of which Day Baker is the manager, has met with excellent success in placing electric commercial vehicles, and it now has a considerable number in operation successfully in widely varying lines of work. No commercial motor vehicle in Boston, probably, attracts so much attention as that owned by the National Shawmut bank. This is one of the largest banking institutions in the city and it employs the General Vehicle Company 1-ton truck constantly during banking hours. The truck is enclosed and at all times carries in addition to the driver an armed guard. It is used principally for transporting bullion between the bank, the subtreasury and other banks and trust companies, for bringing large deposits to the bank from all about the city and for delivering to factories, stores and the like, large pay-rolls. At the recent movement of millions in bullion from the subtreasury to the National Shawmut bank this truck was employed for a large part of the work.

HEAVY ELECTRIC TRUCK WITH BULKY LOAD AT SHOPS OF MASSACHUSETTS SHOE MANUFACTURER

TRUCK FOR MOVING MACHINERY

Another vehicle of the General Vehicle Company that gets hard and constant service is the 1-ton truck owned by the American Tool & Machine Company, manufacturers of machinery, shafting, pulleys and tools. This truck has to carry heavy loads in its delivery work about the city. It has been out of commission only one day in three years and six months. Quite a different character of work is that done by the truck of 2-tons capacity owned by the General Electric Company. It is used principally in the delivery of lamps, motors and other electrical apparatus manufactured by the company. The George Frost Company, that manufactures hose supporters, has lately put a 1-ton General Vehicle truck in commission for general delivery and freight work.

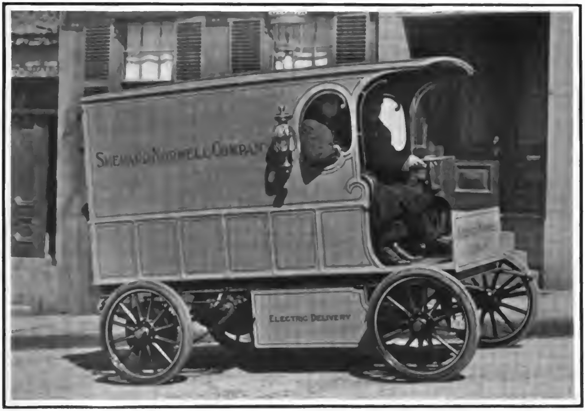
Of lighter vehicles of the General Vehicle Company manufacture the 1,000-pound delivery wagons used by the New England Confectionary Company and the Shepard Norwell Company are illustrative examples. The confectionary company has a large factory in South Boston and for about two years has used the delivery wagon for carrying parcels of its goods from the factory to dealers in and about Boston, the wagon averaging about 35 miles to a charge. Last winter when all the horse-drawn vehicles of the confectionary company were tied up because of the glare ice on the city streets, the electric ran every day. The Shepard Norwell Company, one of the large retail dry goods stores of the city, has a 1,000-pound delivery wagon that in its regular work covers from 30 to 40 miles a day, frequently delivering 200 bundles. Recently, it is said, with a two-hours "boost," this wagon covered 78 miles. One of these 1,000-pound wagons has been ordered by the United States Government for the use of the Boston Post Office. It will be placed in service between the central post office in Boston and the branch offices in Chelsea and East Boston. Extra battery equipment has been ordered so that the wagon can make from 60 to 70 miles a day.

A concern, which while possessing ideal facilities for the use of electric vehicles, has refrained until recently from introducing them, is Walter Baker & Co., manufacturers of chocolate goods in Dorchester. The company has its own electric generating plant and it is a run of about six miles from its factory to the business center of Boston over a road without severe grades. The company has a 2-ton General Vehicle truck and is using it with great success, not only for transporting the finished product from the factory to the in-town office and to dealers, but also in handling raw material from the freight and store houses to the mills. The truck has been almost constantly in service.

FURNITURE DELIVERY BY MOTOR WAGON

The Paine Furniture Company, of Boston, was one of the first large concerns to recognize the value of motor vehicles for its delivery work and it long ago installed a Packard truck for long-distance work. It has since added other Packard trucks, and recently has taken on a 2-ton electric and has ordered another one. The company has learned by experience that the best use to which it can put the gasoline trucks is in long-distance trips outside of a 15 or 20-mile radius of its store. These trucks will be used for delivering loads of furniture in the zone immediately surrounding the suburbs, while the electrics are designed for delivery work in the city and the suburbs, within the 15 or 20-mile radius. With this equipment, the company considers that it has an ideal arrangement for the quick and economical delivery of furniture.

The A. G. Walton Company, of Chelsea, manufacturers of shoes, has a 3 1-2-ton electric truck of General Vehicle make that is doing yeoman service. The company has a large factory in Chelsea but has occasion to transport great quantities of raw material and finished product between the factory and freight terminals and distributing centers in Boston. The truck makes three trips to Boston each day, carrying loads as great as 5 to 6 tons of finished shoes and bringing back leather and other supplies. The Walton company kept a careful record of the express charges that would be made on all the packages carried by the truck and in a single week this record showed a saving of $37.94. The cost at the regular express rates for the work figured at $71.94 and the expense of operating the truck was $34. The regular express charge is 80 cents per ton and with the truck the cost was cut to 38 8-10 cents a ton. Reckoning depreciation of the truck the Walton company estimates that it is saving from 20 to 25 per cent over the old method of trucking. The General Electric Company, whose tungsten lamp factory is in East Boston has a 2-ton electric for carrying goods between the factory and the freight terminals. The Jenney Manufacturing Company of South Boston has two 5-ton trucks for delivery of gasoline and oils; the Houghton-Dutton company, a large department store, has a truck for furniture delivery, the Edison company has a 1,000-pound wagon for lamp delivery and a 3½-ton truck for carrying wire and supplies and also equipped so that the motor can be used for hauling cable through the conduits in the streets, and the Kensington Flower Shops, which has the flower privileges at the new Opera House, has ordered a special fancy wagon for its work in connection with the Opera House trade.



CLOSED ELECTRIC DELIVERY WAGON WITH FINELY FINISHED BODY USED BY BOSTON HOUSE

SIGHT-SEEING ELECTRIC VEHICLES

There are several electric sight-seeing wagons in the city, one a 3½-ton wagon that makes from 25 to 35 miles on a charge, and another a 5-ton wagon that was formerly used as a truck by the Edison company and that, though 7 or 8 years old, still gives good service and covers 35 miles a day.

The "Christian Science Monitor," a daily newspaper published by the Christian Science Church, found itself in a peculiar position in competing with the other newspapers of the city, by reason of its remote location from railroad stations and the central post office, but its problem has been solved to a considerable extent by the employment of a team of Studebaker electric delivery wagons. The publication office is on Falmouth street and as the paper has a very large mail circulation, some means of quick and reliable transportation of its editions from the office to the trains and the post office was essential. It experimented with an 800-pound Studebaker and the results were so satisfactory that three similar wagons were purchased. They are painted white and have the name of the publication on the sides of the covered top. They are geared at twelve miles an hour and usually are driven at the top speed, though care is taken not to exhaust the batteries.

These Studebaker wagons begin operation at about 11 o'clock each forenoon when they receive the first load of papers from the presses. The load varies from 250 to 1,250 pounds and the wagons make four round trips each per day between the Falmouth street printing house and the North and South railroad terminals and the Central Post Office. They average about 20 miles a day each, but have never been run to their full mileage capacity. The vehicles are charged at night at the publishing house, which uses a large amount of current for general purposes, thus bringing down the cost of charging to a low figure. The success of these wagons has been watched with much interest by business men and it is reported that the introduction of similar vehicles in other lines of business in Boston is to come in the immediate future. Other large Studebaker electric trucks in this part of the country are the two 3½-ton trucks and the 1½-ton truck at the Arlington cotton mills in Lawrence.

WAGONS IN VICINITY OF BOSTON

Other manufacturers have a few electric commercial wagons in Boston and vicinity. Among these may be mentioned the Pittsburg delivery wagons, a number of which are in daily use by the Ward-Corby company of Cambridge. This company has a large bakery in Cambridge and has a half dozen or so electric delivery wagons that it uses in sending its products of the oven to the retailers all over the city. Pope Waverley electric delivery wagon is in service of the State Street Trust Company which has a main office on State street and a branch in the Back Bay on Massachusetts avenue. The electric is giving satisfactory service in transporting money and valuable papers between the main office and the branch and in the general work similar to that performed by the electric of the Shawmut National bank.

Electric trucks have uninterrupted admission to the wharves, warehouses and freight terminals of the railroads and steamship companies, whereas motor vehicles driven by other power are ruled out by the companies. After the rule prohibiting power vehicles in these places was passed an effort was successfully made to have electrics excepted.

Altogether it is the opinion of those most intimately associated with the electric vehicle situation in Boston that the outlook is very bright and that the number of these vehicles in operation will constantly increase, as a result of the efforts being directed to that end by the manufacturers, agents, battery men, garage keepers and the electric company, the last named because it sees in the general use of electrics an opportunity to fill up the troublesome gap in the demand for current that occurs after the day's heaviest demand is over and before the heavy demand of the next day begins. There are many hours during the night when much of the current generating machinery is idle and can be used profitably in supplying electric energy for vehicle batteries.

SURFACE TREATMENT OF ROADS WITH TAR*

A Complete and Practical Discussion of a Simple and Comparatively Inexpensive Method of Bonding the Surface of Macadam Roads—Results of Tar Treatment

H. J. SKINNER AND A. D. LITTLE

COAL tar has been employed in road building for many years. Tar macadam roadways were constructed in Nottingham, England, as early as the year 1840, although under rather crude conditions. Coal tar pavements have been tried in various parts of the United States, but, as a rule, the results have not been satisfactory, asphalt being found superior as a paving material. In more recent years, tar macadam roads have been quite successful and this form of construction is now used to a considerable extent.

The application of tar to the surface of a completed macadam road, while comparatively new in this country, was tried in France about forty years ago. The results were rather unsatisfactory, but the practice has been carried on to some extent at intervals since that time, especially in Italy and France.

In the United States, the first experiment which attracted the attention of road engineers was in the summer of 1905, when a series of careful experiments was made at Jackson, Tennessee, by the United States Office of Public Roads in co-operation with the city engineer of Jackson to determine the value of coal tar in the treatment of broken stone roads. The widespread interest created by these experiments led to similar ones in various parts of the country, particularly in Massachusetts, Rhode Island, New York, New Jersey and Pennsylvania.

DEFECTIVE METHODS CAUSE CRITICISM

The variation in the methods of application and the lack of attention to the quality of the tar and the condition of the road have led to a difference of opinion as to the real value of coal tar in surface treatment.

The methods of applying the tar have varied considerably, but perhaps the one more generally used, especially in the earlier experiments, is to remove the dust and all loose particles by thoroughly sweeping the surface of the road and then applying the tar from an open kettle mounted on wheels and fitted with a portable fire box. The tar is brushed over and into the surface with stiff brooms, such as are ordinarily used for street work. The kettle is kept in advance of the workmen and by using two kettles and heating one while the other is in use the process is made continuous. After allowing the tar to soak into the surface for at least ten hours, it is covered with a layer of sand or fine stone screenings. When several hours have elapsed the road is completed by rolling with an ordinary steam road-roller.

In some places, and particularly in Europe, mechanical means have been employed for applying tar. Some years ago the Road Improvement Association held in England a competitive trial in which many of the machines were fitted with ingenious devices. Nearly all of them provided for heating the tar and applying it under pressure by means of compressed air. Some of them were designed for carrying on the whole operation with one passage of the vehicle. The dust and loose particles were first removed by suction and drawn up into a receiver. The tar was then applied by compressed air and spread over the surface of the road by means of automatic brushes. The fine material previously removed was again distributed over the surface and rolled by the steam-heated wheels of the machine. Some of these machines were drawn by horses and others, the larger ones especially, were self-propelled.

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*From a paper read before the American Gas Institute in October.

MODERN OR PENETRATION METHOD

The method most commonly used at the present time is a compromise between strictly surface application and tar macadam construction and is known as the penetration method. In this method the surface of the road is broken up by means of a scarifier, new material added to fill ruts or other depressions, and the road reshaped. After a slight rolling without the addition of water the tar is applied and allowed to stand as in the previous method. A dressing of fine material is then spread over the surface and the road well rolled, with the result that a surface is formed in which all of the spaces between the hard stone are filled with a minimum amount of tar. A road treated in this manner is similar to one built by the tar macadam process, in which the stone and tar are mixed before being laid.

Many of the trials which have been made with tar as a surfacing material have failed because of a lack of appreciation of a number of important details. The structure of the road, its condition at the time of treatment, the traffic to which it is subjected, the character and amount of tar used, are all important factors which are necessary for successful results.

The structure of macadam roads varies according as each engineer has deviated from the original method of macadam construction to meet his own ideas. As a rule, however, the formation of the road is much the same and is of minor importance in comparison with the actual condition of the surface at the time the tar is applied. The road should be dry and as free from moisture as possible, since water and tar are not miscible in any sense, and if the tar is applied to a wet road, the latter is, so to speak, tar proof and proper penetration is impossible. In such a case peeling of the surface is very liable to result, owing to the tendency of the tar to remain on the surface as a crust. It is equally important that the road surface should contain as little dust or loose material as possible, as the latter will absorb the tar instead of allowing the tar to be absorbed by the road. This again results in the formation of a crust which, under certain conditions, will peel off, leaving the exposed surface of the road comparatively free from tar.

CONSIDERATION OF ROAD TRAFFIC

The kind and amount of traffic to which different roads are subjected is very variable, and in cases where the traffic is particularly heavy or excessive ruts and hollows are sure to exist. These irregularities in the surface make even rolling impossible and unless repaired previous to tarring water will collect in them and soon exert a detrimental effect upon the tarred surface. In many instances, traffic has been allowed on the road too soon after treatment, and this alone has been the cause of a number of failures.

The character of the tar is of almost equal importance as the condition of the road. Tars vary widely in composition, even when produced by the same process. The character of the coal used, the method of carbonization and the temperature of distillation all have a decided influence on the composition of the tar. The value of coal tar in the surface treatment of roads depends almost entirely upon the binding power of its heavy bitumens. Besides these bitumens there are present other substances such as water, ammonical liquor, oily constituents, including the light oils and the creosote or "dead" oil, nahpthalene, anthracene and similar compounds, and free carbon, the proportion of which varies according to the manner in which the distillation process has been carried out.

The presence of water in coal tar has a similar effect as moisture in the road. If a tar containing water is applied to a dry road the latter absorbs the water more readily than the tar, producing the tar-proof effect to which reference has already been made. Difficulty is also experienced in handling tar containing an appreciable amount of water, since the water causes foaming, and if the vessel is heated by direct fire the danger of the tar going over the side of the vessel and taking fire is great.

AMMONIA AND OTHER CONSTITUENTS

Ammonia is another undesirable constituent, it being alkaline in nature and having a tendency to form with the oil constituents soluble compounds, which are easily washed out by the action of the rain.

Naphthalene and anthracene, while they exert no particularly harmful effect as in the cases of water and ammonia, have no binding power and their presence simply reduces the amount of bitumens which may be present

Free carbon, like naphthalene, has no detrimental effect, but, on the other hand, it is a useless constituent so far as road treatment is concerned, and its presence reduces the binding power and water-proofing effect, since it possesses none of these qualities itself.

The oily constituents of the tar are valuable to some extent, since they act as diluents. The light oils are more or less volatile and are probably evaporated soon after the tar is applied to the road, but their presence makes the tar thinner and consequently renders their application easier. The creosote oils are also of some advantage, as it is claimed they add life to the tar and prevent its becoming too brittle.

The amount of tar is another important detail, and if more is applied than the road can properly absorb it will remain on the surface and be taken up by the top dressing, with the resulting formation of a crust. Another objection to an excessive amount of tar is that it has a tendency to become sticky in warm weather and slimy in wet weather.

Sand or fine stone screenings have been used as a top dressing in the majority of the trials with coal tar, although occasionally the fine material removed from the road previous to tarring has been used. Stone screenings are probably the best material to use on a macadam road, since they furnish a dressing of the same material as the road itself.

LIMITATIONS OF TAR TREATMENT

Experiments have pretty clearly demonstrated that tar is not adapted for the treatment of gravel or soft earth roads, owing to the fact that it does not amalgamate sufficiently well with these materials to bind them together. For roads of this class, therefore, oil has been more successful than tar. The use of tar has been and must be confined almost entirely to macadam or broken stone roads, and for roads of this nature it is probably more suitable than oil.

Oil, as a rule, has greater power of penetration than tar, but its value is dependent in a large measure on its asphalt base, and before its maximum binding power is reached the more volatile constituents of the oil must be allowed to evaporate. This evaporation is a slow process and until it is complete the disagreeable odor of the crude oil will be apparent and more or less objectionable. The use of oil has also received considerable criticism owing to the damaging effect which it has upon clothes and the paint and varnish of vehicles, especially in damp weather, when a greasy, disagreeable mud is formed.

Tar, on the other hand, solidifies quite completely as soon as it is cold and does not depend except to a small degree on the gradual evaporation of its volatile constituents for its hardening. It is comparatively free from the objection of being picked up and thrown by the wheels of vehicles, and, although it has a decided odor which lasts for a short time after application, this is not particularly objectionable and to most people is much less offensive than that of crude oil. An objection is sometimes raised to the use of tar on account of a fine black dust which wears off of the tarred surface. It is true that such a dust is formed, but the amount is insignificant in comparison with the dust which would have formed if the road had been untreated.

A properly tarred road is similar to an asphalt pavement, although of a more resilient character. The stone is all bonded together by the tar into a smooth, firm surface which can be swept and washed in much the same manner as an asphalt pavement.

CAUSES OF DETERIORATION

The principal agencies which cause deterioration of tarred or oiled surfaces are heavy rain, frost and the decaying organic matter which accumulates on the surface of the road. So far as can be determined one kind of road withstands the action of these agencies as well as the other.

Water gas tar is used in connection with coal tar, but not to any great extent by itself. It has a greater power of penetration and less of it is required, but it is not so lasting in character. It is really in a class by itself and occupies an intermediate position between the temporary and the permanent binders. In some cases where a limited amount of money is available or where for climatic reasons it is advisable to treat the road with the idea of its lasting only through one season, water gas tar should prove a valuable dust layer and any extension of its use will undoubtedly be in this direction.

The value of coal tar in the preservation of macadam roads and as a dust preventive is still unsettled. It is certain, however, that in the majority of cases the life of a treated road has been materially lengthened, and by applying tar the complete rebuilding of many roads at an enormous expenses has been avoided.

One great drawback in the standardization of tar treatment is the impossibility of securing a uniform supply of coal tar. Coal tar is purely a by-product and the processes by which it is derived are never run with reference to the quality of tar produced, but solely to obtain maximum yields of gas or coke, as the special case may be.

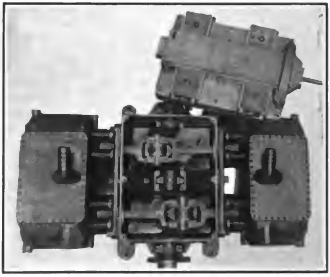
The impossibility, therefore, of manufacturing tar to meet definite requirements makes it necessary to utilize the supply available, but in so doing a certain amount of selection can be exercised and changes made whereby some degree of uniformity is obtained. Some attempts have been made to control the quality of the tar, but with rather unsatisfactory results.

Strictly surface treatment of an already existing road, even under the best conditions, can only be regarded as a temporary expedient, and its use will probably extend only in cases where for financial or other reasons the rebuilding of the road is not justified.

CARLSON MOTOR TRUCK GAS ENGINE

In the Carlson commercial vehicles, recently described in these pages, there is used a motor specially evolved by the makers which possesses several features of merit. The accompanying illustration shows this engine with remarkable clearness. It is of the four-cylinder horizontal type. The cylinders are directly opposed, each pair working on a common crankpin and strictly in line with the axis of the crankthrow.

The connecting rod construction is novel and clearly shown by the illustration. Each rod finishes in the shape of a stirrup with a plate fitting around a little less than half of the crankpin circumference. In pushing the action is obvious, when the connecting rod is pulled by the crankpin it may not be quite as clear. In the passage left by the stirrup shape of the connecting rod heads passes a hinged strap which embraces the two rod heads and the crankpins and binds the whole together. This strap keeps the rods in place when the pistons are pulled away from the cylinder head by the crankshaft.



CARLSON MOTOR WITH COVER REMOVED

The wrist pins at the piston end of the connecting rods are fixed in the rod itself and rotate in the piston, which is a practice opposed to current methods although gaining ground with many makers.

Lubrication to every point is by force feed. The engine in its other details follows current practice, but evidences considerable care in its design to secure accessibility and ease of dismantling.

PRINCIPLES OF THE GASOLINE VEHICLE MOTOR

A Simple Explanation of the Successive Operations Which Form the "Cycle" of the Gasoline Engine—Suction, Compression, Explosion, Expansion and Exhaust—Fundamental Differences Between the Four-Cycle and the Two-Cycle Motor

CECIL P. POOLE

GASOLINE evaporates very rapidly, as one may see by pouring a little in a saucer and watching it grow less and less until it has entirely evaporated. Gasoline vapor when mixed with air burns quietly so long as it is not under pressure. If the mixture be compressed, it burns more and more violently, as the pressure is increased, and when the mixture is compressed until the pressure attains several pounds per square inch, the burning is explosive, somewhat like that of gunpowder. The higher the mixture is compressed, the more violent is the explosion when it is ignited.

The foregoing simple facts form the foundation on which is based the operation of all modern gasoline engines. A mixture of air and gasoline vapor is delivered into the engine cylinder, compressed by the piston and ignited, usually by an electric spark. The mixture burns explosively, producing a sudden increase in pressure behind the piston, and this higher pressure drives the piston outward again; the heated gases resulting from the explosion expand and exert a decreasing pressure on the piston during its outward travel.

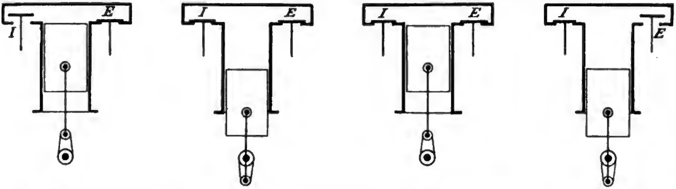


FIG. 1 FIG. 2 FIG. 3 FIG. 4

VERTICAL SECTIONS (DIAGRAMMATIC) OF FOUR-CYCLE MOTOR CYLINDERS AS USED IN MOTOR VEHICLES

TWO TYPES OF GASOLINE MOTOR

There are two general types of gasoline engine: one commonly called the "four-cycle" type and the other the "two-cycle" type. The meanings of these two terms will become evident upon considering the operation of the respective types of engine. The operation of the "four-cycle" (the correct term is "four-stroke-cycle") engine, is illustrated diagrammatically by Figs. 1 to 4, inclusive. The engine shaft is turned over by hand from the position shown in Fig. 1 to that shown in Fig. 2. The downward motion of the piston sucks a mixture of gasoline vapor and air into the cylinder, the inlet valve *I* being opened either by the atmospheric pressure or mechanically from a countershaft (camshaft) driven by the crank-shaft. At the end of the suction stroke the inlet valve is closed by its spring. The crank-shaft is turned over through another half revolution, forcing the piston upward from the position in Fig. 2 to that in Fig. 3, compressing the mixture into the "combustion space," up to a pressure of from 40 to 75 pounds per square inch, according to the design of the engine. Then the compressed mixture is ignited by an electric spark produced by mechanism operated from the engine shaft. The mixture burns explosively, as already described, and the sudden rise in pressure gives the piston a strong impulse downward, which is followed up by a rapidly decreasing pressure due to the expansion of the heated gases produced by the combination of the mixture. The downward motion of the piston from the position of compression, Fig. 3, to that shown in Fig. 4 is the power or working stroke.

THE WORKING STROKE

This working stroke gives to the flywheel of the engine sufficient momentum to carry the crank through another complete revolution with very little falling off in speed. When the piston has reached the lower position shown in Fig. 4, the exhaust valve *E* is opened by a cam on the countershaft already mentioned, and the burned gases are released from the cylinder. The exhaust valve remains open while the momentum of the flywheel carries the piston back to the position in Fig. 1, this upward travel serving to force out of the cylinder all of the burned gases excepting that portion which fills the combustion space. Then the exhaust valve closes, the inlet valve opens and the momentum of the flywheel keeping the crankshaft turning, draws the piston downward on another suction stroke, and so on.

The series of operations just outlined, suction, compression, explosion, expansion and exhaust, constitute one complete "cycle" of events and four strokes of the piston are required to carry out this cycle. Hence, it is a "four-stroke" cycle, and the engine is a "four-stroke-cycle" engine. The two-stroke-cycle engine differs from the type just described in that the complete cycle is carried out in two strokes of the piston instead of four. It also differs from the four-stroke-cycle type in that it has no valves, as it is usually built for motor-vehicle purposes. This makes for simplicity and durability.

TWO-STROKE-CYCLE ENGINE

Figs. 5, 6 and 7 illustrate the working of a common form of two-stroke-cycle engine. In Fig. 5, the piston is supposed to be moving upward, under the influence of the momentum of the flywheel due to a previous power stroke. The cylinder above the piston is filled with a mixture of gasoline vapor and air, taken in the beginning of this upward stroke, and there is a partial vacuum in the casing *C* which enclosed the crank; the upward motion of the piston increases the vacuum in the crank-case and compresses the mixture in the cylinder. When the piston reaches the top of its travel, the lower end of the piston uncovers the port *M* (Fig. 6) which communicates with the supply of gasoline vapor and air, and the atmospheric pressure outside forces the mixture into the crank-case to fill the partial vacuum there. At the same moment the compressed mixture in the cylinder is ignited and explodes, driving the piston down on the power stroke. As the piston moves downward it compresses the mixture in the crank-case to a moderate pressure—usually between 4 and 6 pounds per square inch. Just before the piston reaches the bottom of its stroke, its upper edge uncovers a port, *E*, in one side of the cylinder, and a moment later it uncovers the port *I* in the opposite side. When the piston reaches the lower limit of travel (Fig. 7), both of these ports are fully uncovered. The burned gases escape through the exhaust port *E* and part of the mixture that has been slightly compressed in the crank-case rushes into the cylinders through the passage *A* and the port *I*. All of the mixture cannot be transferred from the crank-case to the cylinder because as soon as enough of the mixture has expanded into the cylinder to allow the pressure to be equalized there is no force tending to cause any further flow. The inrush of fresh mixture from the crank-case to the cylinder is deflected upward toward the combustion space by the projection *D* mounted on the piston head, as indicated roughly by the arrows. The object of this arrangement is to prevent the fresh mixture from passing straight across to the exhaust port and out with the burned gases.

The momentum of the flywheel keeps the crank turning after the power stroke has ended, and the piston is carried back up to the position indicated in Fig. 6, compressing the mixture in the cylinder and forming a partial vacuum in the crank-case, as already described.

Since high compression of the mixture of gasoline vapor and air results in high explosion pressures, it would seem that engines should be built to compress the mixture to very high pressures, say several hundred pounds per square inch. There are, however, several obstacles in the way of such high compression pressures. The two principal disadvantages are the high temperature produced by high compression and the violent shock that would be dealt to the working parts by very high and sudden explosions. If compression were carried too high, the temperature of the mixture would be raised so high as to ignite the mixture before the piston had reached the end of the compression stroke. This, of course, would not only decrease the power of the engine by causing high pressure against the piston in opposition to its direction of motion, but it would strain the working parts and might wreck them. The proper time for the actual explosion of the mixture is just as the crank passes the upper dead center; then the crank and piston are in position to be acted upon favorably by the rise in pressure due to the explosion. It is usually the case, however, that the igniting spark must be produced slightly *before* the crank reaches the dead center in order to give the mixture time to ignite before the center has been passed. If the mixture explodes too soon, it deals a violent backward blow to the piston connecting rod and crank; if it explodes too late, the piston "runs away" from the explosion and its effect is greatly impaired. Imagine, for example, how little effect would be obtained if you tried to push forward a person who was already running away from you at a high rate of speed, and what a shock would be produced by trying to push backward a person running rapidly toward you. The former is an illustration of late ignition and the latter of too early ignition.

The exact moment at which the mixture should be ignited depends on the "quality" of the mixture and the speed at which the engine is running. A mixture that contains either too much or too little air burns more slowly than one in which the proportions are just correct; hence earlier ignition is required by an incorrect than by a correct mixture. The higher the speed of the engine, the earlier should the ignition occur, because a certain lapse of time is necessary for the mixture to explode and the higher the speed the less time is occupied by the passage of the crank over the dead center.

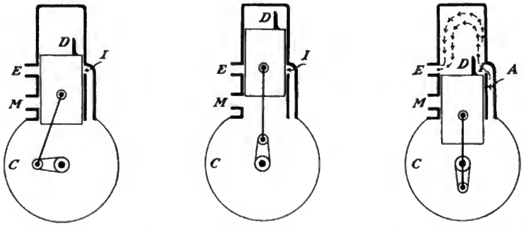


FIG. 5 FIG. 6 FIG. 7

VERTICAL SECTIONS (DIAGRAMMATIC) OF CYLINDERS AND CRANK CASES OF TWO-CYCLE MOTORS

ROCKFORD RAILWAY SECTION AND INSPECTION CARS

SIMPLICITY of construction is a prominent characteristic of the line of gas engine railroad cars for bridge, telegraph and section work and for inspection purposes built during the last four years by the Duntley Mfg. Co., of Chicago. The general style of the No. 4 section car and its carrying capacity are shown in Fig. 1. It will carry comfortably, without crowding, ten men, including the operator. In tests to show its power it has carried ten men on the motor car, and in addition has hauled a hand car loaded with six men and six 15-foot, 90-pound rails, making a total weight of 5,100 pounds, at a speed of 6 miles an hour up a 1½ per cent grade.

The simple construction is shown in the top view of the frame and running gear with floor and toolbox removed, Fig. 2. The double-cylinder engine is disposed horizontally and has no flywheel, no change-speed gearing of any sort, no driving gears, drive chain or friction transmission and no water-cooling system. The connecting rods are coupled direct to a crankshaft that is permanently affixed to one of the axles, while the cylinders are carried in a light frame that is bolted directly to the under side of the frame sills. The inlet valves are automatic but the exhaust valves are operated by a short transverse camshaft across the head of the cylinders, which is driven by a light sprocket chain from the crankshaft. The same camshaft also carries the timer for the jump-spark ignition.

Details of the Rockford engine are shown in Fig. 3, in which it will be noted that a glass oil cup is screwed into the top of each cylinder and that a carbureter of special form is mounted on a short length of cross pipe between the two vertical intake pipes rising from the heads of the cylinders. This engine weighs 120 pounds and is rated at 7½ horsepower. The engine has low compression and operates at a normal speed of 350 revolutions per minute, so that the temperature in the cylinders does not rise to a point where cooling becomes necessary. As a test, one of these cars was placed on a testing table and the engine run continuously with a load at 360 revolutions per minute for an hour in a temperature of 115 degrees Fahr. in a steam-heated shop where there was no cooling draft. The low internal temperature also enables the engine to be run under ordinary conditions and remain free from deposits of carbon on the pistons and cylinder walls.

Instead of special reversing gears, the engine itself can be reversed, the camshaft being arranged so as to make this possible. The control levers are all placed at the top center of the tool-box, convenient to the hand of the operator when occupying the seat, which is made reversible so that the operator can face in the direction the car is running.

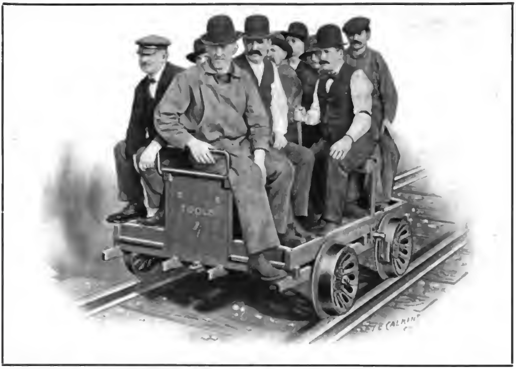


FIG. 1—ROCKFORD RAILWAY INSPECTION CAR BUILT BY DUNTLEY MFG. CO. OF CHICAGO

To start the car, the carbureter lever marked No. 1 is set to operative position; the ignition switch is thrown in by pushing the lever, No. 3, in the direction the car is to run; the spark lever, No. 4, is moved four notches in the same direction and the car is pushed forward by hand until one or two explosions occur in the cylinders. The spark lever is then advanced further until the desired speed has been attained. To slow down, a fifth lever is pulled, which raises the exhaust valves, allowing the charges to escape on the compression stroke before ignition, and the brakes are set by pulling the long brake lever, No. 2. Upon dropping the compression relief lever, the engine immediately resumes its work.

This 7½ horsepower section car has a speed range of

3 to 30 miles an hour, weighs 650 pounds, has a platform 72 inches long by 52 inches wide on a wheelbase of 37 inches, and is fitted with 16-inch pressed-steel wheels. The car has a record of 87 miles on two gallons of gasoline and half pint of lubricating oil, carrying eight men. The car can be removed from the rails by one man.

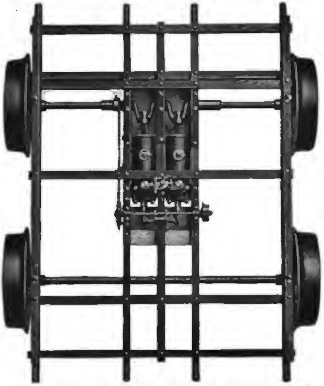


FIG. 2—PLAN VIEW OF CHASSIS OF ROCKFORD CAR

A larger car of the same design but weighing 1,023 pounds and having a maximum speed of 40 miles an hour, is built by the same company for extra heavy service on section or bridge work, or where grades are heavy. It is fitted with a four-cylinder engine of 14 horsepower, and has wheels of 20 inches diameter.

The Rockford inspection car, which is especially adapted to signal, telegraph and bridge inspection work, accommodates two passengers besides the operator, two of the seats being placed directly over the wheels on one rail, while the third is just inside of them. There are four wheels, preventing all danger of derailment. A double-cylinder engine of 3½ horsepower drives direct to the wheels on one side only. A two-gallon fuel tank holds gasoline sufficient, it is claimed, for 180 miles if the speed dies not exceed 20 miles an hour. Complete, the inspection car weighs only 350 pounds, and has been removed from the rails by one man in three seconds.

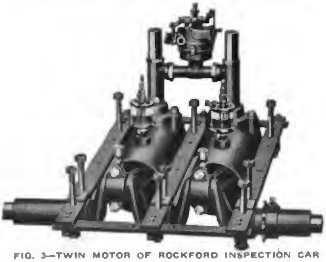


FIG. 3—TWIN MOTOR OF ROCKFORD INSPECTION CAR

Leading railroads that are using Rockford section and inspection cars are the Chicago, Milwaukee & St. Paul, the Chicago & Northwestern, the Chicago, Rock Island & Pacific, the Atchison, Topeka & Santa Fe, the Union Pacific and the Boston & Maine.

The St. Paul, which was the first road in the country to equip a division exclusively with gas engine section cars, increased the sections from 4 miles to 6, double track, and reduced the number of foremen on the division from 33 to 22. As a result of these changes following the displacement of the old hand cars, the saving in labor, on the basis of winter force, amounts to $1,365 a month, while in the summer there is an additional saving of $1,092 a month in labor. These economies are figured on the lessened number of sections and the saving of an hour per day per man in going to and returning from work.

A roadmaster making a report to the superintendent of the road at Savanna, Ill., shows that by the use of the motor section cars the sections would be increased from 4 miles to 12 miles, eleven foremen and eleven assistants would take the place of 33 foremen, and 179 laborers would replace 198, so there would be a resulting saving of $5,760 per year. Besides this reduction in labor expense, however, the road was able to dispense with the equipment of seven sections, including seven tool-houses 10 by 12 and 14 by 16 feet in size, with their stocks of tools which could be spared, and an equal number each of hand cars and push cars.

The Rock Island Railroad recently placed in service between Enid and Anadarko, Okla., a twenty-five passenger gasoline motor car built by the Stover Motor Car Company, of Freeport, Ill.

Joseph Clouse, rural mail carrier on route No. 13 out of Hope, completed the twelfth year of his service recently. He was the first rural mail carrier appointed in the United States and was given service on the first rural route established. He has taken 800,000 pieces of mail from the Hope post office, in the delivery of which he has traveled 95,000 miles. He began with a horse and cart at a salary of $200 per year and now he delivers the mail with an automobile at a salary of $900 per year.—Louisville *Courier-Journal.*

Manufacturers of motor trucks will be invited to participate in the motor show which will be held at the Columbus Auditorium under the auspices of the Columbus Automobile Club, some time in March. A committee consisting of Fred H. Caley, O. H. Perry, Herman Hoster, N. O. Aeby and Perin B. Monypeny has been named to arrange the affair. It is intended that the show follow the exhibition at Buffalo and the local committee will probably purchase the decorations from the Buffalo management. Motor trucks will be given a separate part of the floor space.

ALCOHOL AND GASOLINE CONSIDERED AS FUELS

Commercial Deductions from Comparisons of Gasoline and Alcohol Tests on Internal Combustion Engines Conducted by the United States Geological Survey

ROBERT M. STRONG

THE following report is a summary of the commercial results which were obtained from 2,000 tests conducted by the United States Geological Survey at St. Louis, Mo., and Norfolk, Va., in 1907 and 1908, under the technical supervision of R. H. Fernald, engineer in charge of the producer-gas section of the technologic branch. The tests dealt primarily with gasoline, forming part of the investigation of mineral fuels provided for by acts of Congress. To determine the relative economy and efficiency of gasoline it was compared with denatured alcohol. The tests, many of which were undertaken in connection with work for the Navy Department, supplemented, to a certain extent, the work of previous investigations, but only so far as was necessary to emphasize some of the more important points and to lead up to the defining of conditions required for the economical use of gasoline and alcohol.

In order to determine and eliminate the affecting engine conditions as far as possible, the investigation was commenced by making comparative gasoline and alcohol tests on the same engines. These tests were repeated on other engines of approximately the same size and speed, having different degrees of compression, different methods of governing, and different carburetors. The final report will include much material that may be of use in engine design, but that side of the investigation was not pursued any further than was necessary to obtain the best possible results for alcohol and for gasoline with the engines at hand, and to prove that the minimum fuel-consumption rate for each could be obtained in approximately the same manner. The effects of engine and of operating conditions both have a bearing on the commercial deductions but will be discussed only in a general way at this time.

Differences in Engines

GENERAL STATEMENT

Gasoline and alcohol engines are built and operated on exactly the same principles, and the action of the two fuels is relatively the same. Explosive mixtures of the vapors of gasoline and of alcohol with air are formed in the same manner, and the subsequent burning of these explosive mixtures in the engine cylinder takes place in a similar way and with similar results.

GASOLINE ENGINES RUN WITH ALCOHOL

Almost any gasoline engine with a well-designed carburetor will run as well with alcohol as with gasoline, from the standpoint of operation, except for a difference in case of starting and in certainty of operation at low speeds. Under conditions requiring widely varying speeds the engine is less certain to operate satisfactorily at very low speed when alcohol is used, unless some special adjustment is made. The only change required for the use of alcohol in a gasoline engine, if any, is in the size of the fuel passageways. The fuel needle valve must be capable of being opened twice as wide for alcohol as is required for gasoline, and the spray nozzle must not be restricted to just the size that is required to supply the needed quantity of gasoline. The fuel passageways in a carburetor can usually be easily drilled out, and so far as producing power at constant speed is concerned the engine will be just as serviceable with either fuel. This change need not be such as to affect the consumption of gasoline, but with this change alone the consumption of alcohol will be from one and a half times to twice as much as the consumption of gasoline for the same power.

SPECIAL ENGINES FOR ALCOHOL

By using alcohol in an alcohol engine with a high degree of compression (about 180 pounds per square inch above atmospheric pressure—much higher than can be used for gasoline on account of preignition from the high temperatures produced by compression), the fuel-consumption rate in gallons per horsepower per hour can be reduced to practically the same as the rate of consumption of gasoline for a gasoline engine of the same size and speed. The indications are that this possible 1 to 1 fuel-consumption ratio by volume for gasoline and alcohol engines will hold true for any size or speed, if the cylinder dimensions and revolutions per minute of the two engines are the same.

An alcohol engine is as adaptable to commercial requirements as a gasoline engine, except that with the present types of carburetors the same increased difficulty in starting and in operating at very low speeds is experienced as for a gasoline engine when alcohol fuel is used. The adaptability of alcohol is such, however, that this difference, which is due to ineffective vaporization, is not necessarily permanent.

When alcohol is used in a gasoline engine with the maximum degree of compression for gasoline, the available horsepower of the engine is increased about 10 per cent. An alcohol engine with the maximum degree of compression for alcohol will have an available horsepower 30 per cent. greater than a gasoline engine of the same cylinder size, stroke, and speed. Owing to the higher explosion pressures, however, an alcohol engine should be built heavier than a gasoline engine, but the weight per horsepower may be less.

ALTERATION OF GASOLINE ENGINES

Some gasoline engines may be so changed that a sufficiently high compression pressure is secured to make it possible to reduce the consumption of alcohol in gallons per horsepower per hour to an equality with that for gasoline before the engine was changed; the change, however, precludes the further use of gasoline, as it can not be used satisfactorily with compression pressures much in excess of 70 to 75 pounds per square inch above atmospheric.

The degree of compression may be most easily changed by lengthening the connecting rod, which changes the position of the piston at the extreme end of the compression stroke. This can only be done, however, in an engine which is not counterbored and in which the shape of the clearance space is such that the piston will not strike the cylinder head or valvees.

If the cylinder is counterbored, or if there is not sufficient room at the head of the cylinder to allow the piston to travel back far enough to increase the compression pressure to the amount desired, a new cylinder head should be cast with smaller clearance space. Attaching plates to the piston or cylinder head is seldom, if ever, satisfactory. The arrangement of the valve-actuating mechanism often determines the position of the valves, which may be such that a small enough clearance space can not be secured without almost an entire redesign of the engine. Furthermore, with the increased compression pressure required for the economical use of alcohol, the maximum pressure from explosions or combustion will increase and will be as high as 600 or 700 pounds per square inch for maximum load when the compression is raised to 180 or 200 pounds per square inch above atmospheric pressure.

Effects of Fuel Quality

MIXTURES OF GASOLINE AND ALCOHOL

The increased difficulty of starting an engine with alcohol and the increased uncertainty of operation under variable speed conditions has suggested the use of gasoline and alcohol in a double carburetor, which mixes the vapors or sprays of the two fuels with air in the usual manner. Tests on two similar engines having different degrees of compression were made with such mixtures. For the two engines twenty-six and twenty-one tests were required to obtain the best time of ignition and best mixture quality (as regulated by the fuel needle valve and auxiliary air valve) for seven different proportions of gasoline and alcohol. The results obtained are not as conclusive for the tests with the higher degree of compression as might be wished on account of affecting engine conditions which were known and recorded but not eliminated. The results of these tests, which will be given in full in the final report, indicate, if rightly interpreted, that the maximum thermal efficiency for mixtures of gasoline and alcohol will vary from that for alcohol alone to that for gasoline alone, when the best degree of compression is used in each case; and that the total fuel consumption will not be less than the minimum for either fuel alone and will depend on the limiting degree of compression for each different proportion. If this be true, there is no advantage in using gasoline and alcohol together except for starting and operating under conditions of variable speed; and these advantages should be obtainable through some other means, such as more suitable design of induction passageways and carburetor. Moreover, the use of gasoline in any appreciable quantity does away with many of the advantages that are obtained from the use of alcohol alone, such as safety and absence of disagreeable odors.

GASOLINE WITH A SPRAY OR JET OF WATER

The fact that the limiting compression pressure for gasoline and alcohol used together was always greater than for gasoline alone suggested that possibly by substituting water for alcohol and so increasing the limit of compression a corresponding increase in thermal efficiency for gasoline could be obtained. Following this suggestion, tests were first made on a gasoline engine with various proportions of gasoline and water. So far as possible the best results were obtained for each given proportion, from all gasoline to as much water as gasoline, but no change in the thermal efficiency or rate of consumption of gasoline could be made; this result showing that the effect of the water, if any, was balanced. Since higher compressions could be used, depending on the proportion of water, a similar set of experiments was made with one of the alcohol engines in which the compression pressure was about 130 pounds per square inch. Again the thermal efficiency could not be increased or the consumption rate decreased to values better than the best obtained for gasoline alone in a gasoline engine. For the two engines twenty-eight and twenty-three tests were required to determine the best possible results for each percentage of water used; but the results are not conclusive, for there is a question whether the particular engine used for the latter tests, with the higher degree of compression, was free from conditions of construction that affected the best results obtainable. Details of these tests, which have been worked up in full, are to be given in the final report and will afford much information to anyone interested in carrying the investigation further.

In general, the introduction of a small quantity of water with the fuel will prevent preignition from too high compression or overheated parts in the clearance space. The heavy explosion pound often obtained in a gasoline engine operating under maximum load may be entirely eliminated and the running of the engine made much quieter and smoother by using a small quantity of water. The shock and wear of moving parts is thus obviously reduced. If the water contains any grit, however, the cylinder and piston will soon become scored; hence ordinarily it is not advisable to use a spray of water continuously with the air or fuel. The amount of cooling water required to keep the cylinder walls at a given temperature is diminished very noticeably when as much water as gasoline is taken into the cylinder, and the effect of smaller quantities of water is proportional.

ALCOHOL OF DIFFERENT STRENGTHS

We are not limited to the use of denatured alcohol, which is about 90 per cent. ethyl alcohol, so far as the engine is concerned. Even 50 per cent. alcohol can be used, though not very satisfactorily. With this grade an engine is hard to start and is uncertain in operation; that is, the operating conditions are limited. The thermal efficiency decreases rapidly with increased dilution. The rate of decrease of the thermal efficiency with decrease in percentage of alcohol, however, is not constant, but is more and more rapid as the alcohol becomes more dilute. From 94 per cent. to 80 per cent. alcohol, however, the consumption of pure alcohol is about the same, and the total consumption is almost directly proportional to the increase in percentage of water.

The maximum power of the engine also decreases as the alcohol is diluted, but, as is the case with the thermal efficiency, the percentage of decrease with dilutions between 94 and 80 per cent. is negligible. When 50 per cent. alcohol is used, however, the maximum horsepower of the engine is only 72 per cent. of that for 94 per cent.

alcohol. Less cooling water is required for the engine cylinders with alcohol than with gasoline, and when the alcohol is diluted with water a further reduction is made in the required quantity of cooling water, the effect being similar to that produced when water spray is taken into the cylinder with the mixture of gasoline vapors and air. When 50 per cent. alcohol is used scarcely any cooling water is required.

Full details of the tests, from which the foregoing results were obtained, are to be given in the final report. Some of the data are very interesting, including indicator diagrams from two sets of experiments with different carburetors. One set of fifteen tests was made with a double carburetor, with which the sprays of water and alcohol were mixed. For the other set of thirty-one tests previously diluted alcohol was used in a special carburetor. The best results for five and six different percentages of dilution, respectively, were determined. These tests were made on a gasoline engine with a considerably lower degree of compression than that found best for 94 per cent. alcohol. No attempts to use higher degrees of compression for the more dilute alcohol were made. The results are conclusive as far as they go. They probably would not be different had a higher degree of compression been used; but, be that as it may, the commercial significance of the results as obtained lies in the fact that if 80 per cent. alcohol can be manufactured for 15 per cent. less per gallon than 90 per cent. alcohol it becomes a commercial advantage to use the lower grade, provided the difference in cost of handling the greater bulk does not offset the gain in cost of manufacture. It is even possible that the use of 70 per cent alcohol or lower grades will prove to be cheaper; but the use of these more dilute alcohols is limited to a certain extent by the difficulty of starting an engine using them and by the increased uncertainty of operation, especially under the conditions of variable speed. Adaptability must be taken into account when comparing fuels.

RELATIVE ADAPTABILITY OF GASOLINE AND ALCOHOL

Different properties limit the availability or determine the adaptability of liquid gasoline and alcohol and their combinations for use in internal-combustion engines of existing types. Gasoline is more volatile than alcohol, and the heat of combustion of a pound of gasoline is considerably greater than that of a pound of alcohol. The weight of air theoretically necessary for complete combustion of a pound of gasoline is different from that for alcohol, but the theoretical heating values of a cubic foot of gasoline vapor and air and a cubic foot of alcohol vapor and air, with just sufficient air for complete combustion in each case is very nearly the same—about 80 British thermal units. Further than this but little is positively known about the properties of the working mixtures of alcohol or gasoline vapors and air, except that the pressure to which differently proportioned explosive mixtures of air and vapors of either fuel can be compressed without preigniting in the engine varies, and that an explosive mixture of alcohol vapor and air can be compressed to over twice as high a pressure as an explosive mixture of gasoline and air before self-igniting (preigniting in the engine).

Mixtures of air and fuel vapors, or sprayed fuel, are delivered to the cylinder of an engine, mixed with the remaining hot products of combustion, and subsequently burned. Differences in the homogeneity and intimacy of this ultimate mixture, in the limit of excess of air that can be used without the mixture becoming too dilute to fire and in the rate of flame propagation, may each affect the completeness of combustion, and though the mixture quality be relatively the same alcohol may burn more completely than gasoline, or vice versa. The specific heat of the burned or burning charge may also be different for alcohol and for gasoline mixtures, thus changing the basis of comparison, and theoretically may also affect the rate of heat loss to the cylinder walls. But be all these things as they may, the ultimate effect is such that alcohol can be used a little more efficiently than gasoline, even in the same engine with the same degree of compression—that is, more efficiently with respect to the percentage of available heat that is transformed into useful work, but with equal efficiency with respect to the quantity of fuel consumed when the best degree of compression for each is used.

Considering only the heating values of gasoline and alcohol, it is obvious that, if other factors are equal, the relative consumption of alcohol and gasoline will be inversely proportional to their respective heating values. The low heating value of denatured alcohol, which corresponds very closely to 94 per cent. by volume ethyl alcohol, will average about 10,500 British thermal units per pound, while the low heating value of 0.71 to 0.73 specific gravity gasoline will average about 19,100 British thermal units per pound. The comparison gives a consumption-rate ratio of 1.8 to 1 by weight for a thermal efficiency ratio of 1 to 1. In actual operation, however, where gasoline and the same alcohol were each used in medium-sized (10 to 15 horsepower) stationary gasoline engines without change of compression or speed, and the operating conditions, including load, were limited to the best possible for each fuel, a ratio of alcohol consumption to gasoline consumption in pounds per brake horsepower per hour was obtained as low as 0.98 to 0.59, equivalent to 1.66 to 1 by weight, or 1.45 to 1 by volume, with a thermal efficiency ratio of 28 to 26 per cent. (based on the low heating value and indicated horsepower), or 1.1 to 1. By raising the degree of compression from that best for gasoline (about 70 pounds per square inch above atmospheric) to that best for alcohol (about 180 pounds per square inch above atmospheric) the consumption-rate ratio was further reduced and a ratio of 0.7 to 0.59 pound per brake horsepower per hour, equivalent to 1.2 to 1 by weight, or 1 to 1 by volume, was obtained with a thermal efficiency ratio of 39 to 26 per cent. or 1.5 to 1.

These figures are not the results of single tests, but are the average values obtained for a number of tests under identical conditions; furthermore, these values were duplicated on different engines and at different times on the same engine. They represent the best practical values that were obtained for each fuel and stated degree of compression with the equipment at hand. They were obtained under special test conditions, however, and are not commercial values; nor were they obtained offhand, even by skilled operators.

Likewise, a consumption rate was obtained as low as 0.58 pound per brake horsepower per hour for gasoline with a corresponding thermal efficiency of 28 per cent., but the compression pressure used was 90 pounds per square inch above atmospheric. With this degree of compression, it is necessary to use the weakest mixtures that will explode, in order to prevent preignition, and the load had to be reduced accordingly. Heavy loads could not be carried without excessive preigniting. Similarly, a fuel-consumption rate of 0.68 pound per brake horsepower per hour, with a corresponding thermal efficiency of 40 per cent., was obtained for alcohol, with a compression pressure of 200 pounds per square inch above atmospheric, but preignitions were prevented only with difficulty and by a method similar to that used with gasoline, so that the conditions under which these results were obtained were not considered practical and the values have not been used in the discussion. They do not, however, change the ratios given.

The thermal efficiencies given in this discussion were calculated from the indicated horsepower and the lower heating value of the fuel. The method employed in determining the average indicated horsepower for each load was carefully worked out and the results were very satisfactory. They are consistent throughout with the brake horsepower determinations. It is not at all impossible to obtain the average indicated horsepower with sufficient accuracy for all practical purposes, if the load is kept reasonably constant; but the indicator diagrams must be taken in a careful, systematic, and understanding manner to be of any value at all.

The difference between the brake and the indicated horsepower, or the friction loss of the engines used, was practically the same and constant. For 484 tests on the five engines the average difference was 2.3. A full description of the methods used in determining the average indicated horsepower from the indicator diagrams, with tables giving details of the tests from which the mechanical efficiency of each engine at various loads was obtained, will be given in the final report.

(To be continued.)

SIGHTSEEING WAGONS AT SEATTLE

The two sightseeing cars shown in the accompanying engraving are Packard 3-ton truck chassis fitted with special bodies accommodating 34 pasengers each. They were shipped early in the year to Seattle to be used in transporting passengers at the Alaska-Yukon-Pacific Exposition during the present year.

PACKARD SIGHTSEEING CARS USED AT ALASKA-YUKON-PACIFIC EXPOSITION IN SEATTLE

LETTER OF EXPLANATION

Editor THE COMMERCIAL VEHICLE:

SIR—We wish to inform your readers that the Washington Motor Vehicle Company has been organized and is manufacturing commercial electric vehicles in Washington, D. C. The officers are A. C. Moses, president; W. H. Conant, vice-president and general manager; H. B. Leary, treasurer, and S. C. Peelle, secretary.

Our idea in calling attention to this is to clear up the confusion existing regarding our name and history. Announcements have apeared about us under the name of Pittsburg Motor Vehicle Company and a company by that name in Pittsburg has issued a statement to the trade reflecting upon our methods. The facts are as follows:

Mr. R. B. Ward, president of the Pittsburg Motor Vehicle Company, of Pittsburg, offered to sell the entire company if W. H. Conant, at that time their general manager, would raise the necessary money. Because of certain conditions his proposition was not considered by the gentlemen who became interested in the matter, and instead a verbal agreement was reached to buy the name and good-will only. On this basis a company was formed in Washington, D. C., and incorporated under the West Virginia laws as the Pittsburg Motor Vehicle Company, all in accordance with the previous arrangement between Mr. Ward and ourselves. When it came to signing and paying, the deal fell through, although we were prepared to carry out our part of the agreement, and we at once changed our name to its present form.

The Secretary of State of West Virginia in the meantime had given out the name of the new company to a newspaper and from there to the trade papers the original name found its way.

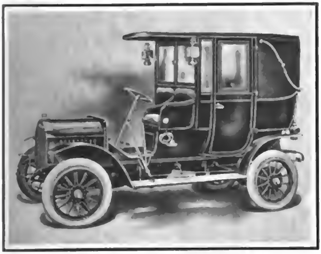
Any statement therefore that we have been "circulating reports" is misleading and not a statement of the facts.

WASHINGTON MOTOR VEHICLE COMPANY.

Traction engines, chiefly propelled by steam power, which are very generally used in England for road haulage have to be registered with the council of the county in which they are operated. A license is then issued, the minimum charge for which does not exceed $50 a year. This permits the unrestricted use of the machine only in the county in which the license was issued. Each county requires a separate license.

ATLAS TAXICAB BUILT IN SPRINGFIELD, MASS.

THE Atlas cab, marketed by the Atlas Motor Car Co., of Springfield, Mass., is one of the comparatively few American machines designed and built expressly for public livery service. It is not in any sense a made-over pleasure car, but is fashioned so as to withstand the constant rough usage which a public cab is subjected to in carrying fares about city streets and suburbs. A feature of the construction is the Atlas two-cycle gas motor, which is, of course, extremely simple in design and for this reason, especially, is very durable, requiring a minimum of repairs. The first Atlas cabs were marketed in the spring of 1908 and since that time cabs to the value of several hundred thousand dollars have been sold to operators in New York, Chicago, St. Louis, Boston and other cities, including the following: New York Transportation Co., Motor Transportation Co., Kayton Taxicar & Garage Co., New York Livery & Auto Co., J. B. Hall, Dakota Stable Co., R. Taggart, Jr., C. R. Skelton, Hoyt & De Mallie, New York City; Cronin Automobile Co., Syracuse; Taxi Associates, Boston; Chicago Taxicab Co., Chicago; Chattanooga Taxicab Co., Chattanooga, Tenn.



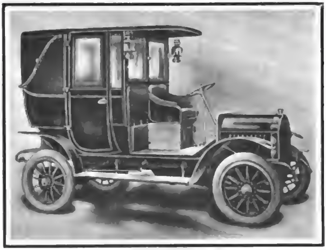
DRIVER'S SIDE OF ATLAS TAXICAB

The Atlas cabs were designed by Mr. Harry A. Knox, having in view the requirements of reliability, low maintenance cost and durability, and also to secure the minimum amount of mechanism with a maximum amount of body room, ease of riding, ample power and simplicity of control.

As previously noted, the Atlas cab is fitted with the Atlas two-cycle, two-cylinder motor, which has but five moving points. The cylinders are 4½ inch "square." The crankshaft is of special carbon steel hardened, ground, and polished to size and running in solid bronze bushings. The pistons are of special design having four channels on top with deflecting boss in the center, the exhaust going out and the new charge of explosive gas coming in on four sides of the cylinder, thus giving a uniform temperature of the pistons and cylinders. All cylinder and crank-case joints are ground and lapped, metal to metal, and are closed without packing, insuring a perfectly tight crank case and obviating all possibility of leakage.

The motor is water cooled, a centrifugal gear-driven pump being employed to give a forced circulation. The lubrication system is very carefully worked out, and includes a Hancock mechanical force-feed oiler with piping direct to the main bearings and to the pistons. The oiler is gear driven, so that there is no belt to cause trouble in operation. The carbureter is of special Atlas design, of the float-feed type, with mechanically fixed proportion of air and gas at all engine speeds. The only adjustment provided is in the gasoline flow from the feed tank, which can be regulated from the driver's seat by a thumb screw and dial placed on the dash. Ignition is by Bosch magneto with high-tension spark plugs. The clutch is of the internal expanding type lined with Raybestos. The gear set is of the Brown-Lipe, three-speed type, with gears of very tough steel carefully hardened. A very complete braking system is provided, including running brake on the transmission operated by the driver's foot and emergency brakes fitted to the rear wheels which are set by the usual side lever. The steering wheel is of ample size, designed for heavy work, and carries in the usual positions on top the throttle and spark-control levers working on a hardened sector.

The frame of the Atlas cab is of pressed steel, narrowed at the front so as to permit a wide turning angle of the steering wheels, and in consequence the cab can be turned in a 28-foot street without backing. The front axle is of I-section, drop forged, and the rear axle is of the full floating type with Timken bearings. Springs for the Atlas cab are made from a special grade of Krupp steel; the rear springs are ¾ elliptic, 52 inches long, with seven leaves, and the front springs are half elliptic, 42 inches long. Wheels are of the standard wood artillery type, with twelve spokes, and are fitted with quick detachable rims and run on Timken roller bearings. The wheel base is 102 inches, tread 56 inches, and the axle clearance 10 inches.



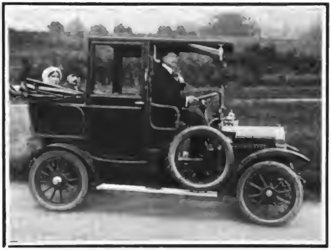
ATLAS CAB WITH TWO-CYCLE MOTOR

The bodies of the standard Atlas taxicab are made of metal, and seat 5 persons inside on permanent seats.

PORTION OF THE FLEET OF FRANKLIN CABS OPERATED BY PITTSBURG TAXICAB COMPANY

MOTOR CABS FOR MONTREAL

A shipment of 25 motor cabs of the type shown in the accompanying illustration was recently made by the Hillman-Coatalen Motor Company, of Coventry, England, to Montreal operators. This vehicle is fitted with a four-cylinder gasoline motor rated at 12-15 horsepower and is a very capable hill climber. On level ground it is very quiet in operation and reasonably fast.



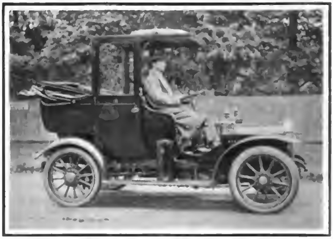
HILLMAN-COATALEN CAB FOR MONTREAL

The chassis of this vehicle has been specially designed for cab work. The frame is of pressed channel steel. The four-cylinder engine has a bore of 3½ inches and a 3⅜-inch stroke. The cylinders are ground by a special process, and the pistons are also ground and faced. The crank-shaft and big end bearings are of generous dimensions, the bearings being lined with white metal and bored out to a dead fit. Lubrication is mechanical by means of a pump fitted in the sump of the crankcase, which forces the oil over all the motor bearings, the supply being replenished from a tank fitted on the dashboard. High tension magneto ignition is fitted as standard, and a three-jet carbureter is provided, this latter allowing such results as 24 to 26 miles to the gallon of gasoline during service under load. Cooling is provided for by means of a honeycomb radiator and high-speed pump, which in either hot weather or traffic functions correctly. From the three-speed gear set the power is transmitted to the rear live axle by means of a nickel steel cardan shaft.

MOTOR CABS FOR VIENNA

The motor Straker-Squire cab shown in the accompanying illustration is one of a lot of 400 similar machines recently sold in London for service in Vienna. The cab is rated at 14-16 horsepower and is fitted with landaulet body to carry four passengers. The wheel base is 96 inches and the tread is 54 inches.

The frame of the chassis is of pressed steel, narrowed in front so as to allow for an exceptional lock, the vehicle being quite capable of turning in a 25-foot road. The engine which gives 18.5 horsepower according to R. A. C. formula, has four cylinders of 85-mm. bore and 87-mm. stroke, the cylinders being cast in pairs. Ignition is by high-tension magneto, and lubrication automatic. The carbureter is designed so as to give very economical results in trafficky districts. A vertical gilled tube type of radiator is fitted, enclosed in a brass mount, the circulation being on the thermo-syphon system, while a belt-driven fan assists in inducing a draught. A clutch of the leather-faced cone design takes the power from the motor to the three-speed gear set, which is operated through a gate, and from the gear—as is standard with practically all cabs now—a cardan shaft is used as a final transmission to the rear live axle. The road wheels are of the artillery make, fitted with 810 by 90 mm. pneumatic tires. The driver's seat is on the right-hand side of the cab and an extension of the top acts as a shelter and also is available for carrying spare tires or baggage.



STRAKER-SQUIRE MOTOR CAB FOR VIENNA

TURNER.

INCREASING TRAFFIC IN BALTIMORE

The Taxicab Company of Baltimore, which began business with five cabs, has bought out the Belvidere Hansom and Coupe Company, from the owners, Charles H. Knapp and H. M. Little, and by October 15 will have twenty-eight additional vehicles in service. These will serve all the hotels, barring the Rennert, and Union Station. The Rennert is looked after by the Harry L. Stewart Company, which started business last month with twenty-five cars. In addition to buying the Belvidere Hansom and Coupe Company, the Taxicab Company of Baltimore has leased the livery stable conducted by Mr. Little on North Howard street. This building, which is three stories high, 175 feet wide and 170 feet deep, is to be transformed into an up-to-date and handsome brown-stone garage.

Many of the cabbies of Baltimore, who have driven cabs and carriages for years, realize that their vocation is rapidly on the wane and have taken steps for their future livelihood. They are at present learning to be chauffeurs. Some of those who have graduated are at the present time occupying positions at the wheel of taxicabs.

TAXICABS FIGURE IN DISPUTE

The most notable victory ever won by motor-vehicle interests in Pittsburgh is that of the Mt. Washington-Duquesne Heights taxicab line which has been running for several months between Wabash station and the foot of the Duquesne Heights incline, a rival to the Pittsburgh Railways Company. Last spring the railways coropration refused to longer give its passengers on the Heights transfers from the incline to its cars. As a result, the taxicab line was started. From its first day its cars have been crowded and the loss in traffic by the railways company would have purchased transfers for its passengers probably ten years. At last the officials of the railways company have agreed with the Duquesne Heights Inclined Plane Company, winning a slight factor over the latter in the settlement. Under the old arrangement, each concern divided equally the nickel fare from the transfer ticket sold. The railways company will now secure 3 cents out of every 5 cents paid by passengers to the Inclined Plane Company. The transfer contract between the railways' company and the Monongahela Inclined Plane Company has also been renewed on a satisfactory basis.

RYKNIELD 5-TON GASOLINE TRUCKS

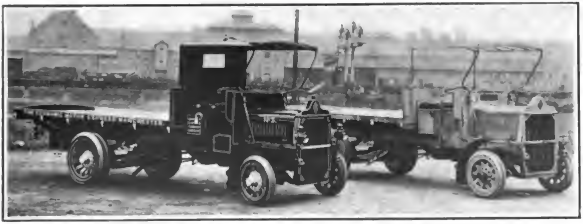
An interesting example of the growing popularity of the heavy gasoline truck in England is afforded by the view shown herewith of a pair built to carry 5-ton loads by the Ryknield Motor Co., Ltd., of Burton-on-Trent. As will be seen from a glance at the engraving, this make of English commercial chassis is very substantial, and in consequence has gained quite a reputation with brewers, among whom are numbered the famous houses of Bass & Co., Truman, Hanbury, Buxton & Co., and Allsops, the first two named owning small fleets of these giant vehicles.

The trucks illustrated are quite the latest product of the Ryknield Co., the chassis of which weigh about 7,000 pounds, and in spite of their weight and large dimensions are very nice running machines. The motors fitted are standard with this maker, having four cylinders of 5 1-8 inch bore and a 6 inch stroke, developing about 45 horsepower at 850 r.p.m. Leather faced cone clutch and four-speed gearset are features.

For 5-ton truck work the Ryknield chassis is characteristically British throughout—even to the Shrewsbury and Challiner tires—and as such has really earned the laurels which it has won. As a last line the enormous vertical gilled tube radiator and ninety-four square feet of platform area may be noted. TURNER.

The Ohio State automobile department has awarded the contract for furnishing 30,000 sets of number plates for use in 1910 to the Enterprise Enameling Company, of Bellaire, O. The number plates, which will be used on pleasure cars and motor trucks alike, consists of a mahogany-colored background with white leters and figures. In addition to the serial number the plates will contain the word "Ohio" and the calendar year.

The latest addition to the fleet of motor vehicles owned by the Federal Government is a Baker electric express wagon, which has just been purchased from the Cook & Stoddard Co., local Baker agents, for the use of the White House. The machine will be put to varied uses, but its chief function will be to carry the White House mails. It will also be used to convey baggage to the station whenever the President or any member of his family sets out on a jounrney. The machine has a capacity of 1,000 pounds, and is of the familiar Baker construction, with a 3 1-2 horsepower motor.



LATEST MODEL OF RYKNIELD (ENGLISH) GAS MOTOR TRUCK FOR 5-TON LOAD

The Commercial Vehicle

Vol. IV November 1909 No. 11

Published Monthly by The Commercial Vehicle, Incorporated, at
1402 Broadway, New York City

Cable Address
Comveh, New York

Long Distance Telephone
425 38th Street, New York

H. F. Donaldson, President and Editor
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Advertising Department
Warner S. Young

Subscription Rates

United States, Canada and Mexico	One Year $2.00
Other Countries in Postal Union . . .	One Year $3.00

Notice to Advertisers

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Entered as second-class matter, September 13, 1906, at the post office, New York, N. Y., under the Act of Congress of March 3, 1879.

DISTRUST REPLACED BY CONFIDENCE

Our readers will doubtless have noticed that in the reports of the commercial vehicle situation in the larger cities, published in this and previous issues, emphasis is laid by our local correspondents upon the setback which the motor vehicle has received by the failure of the early models to meet expectations. Disappointments with the capacity of machines, in respect to load and speed, and with the maintenance charges, have in too many instances created a prejudice which it has been very difficult to overcome in these later days, and every salesman knows that it is easier to interest an entirely new customer than one who has previously bought and become dissatisfied.

The complete explanation of the causes for such a widespread condition of dissatisfaction is not as simple as it might appear. At first thought the casual observer is very apt to say that the earlier models of vehicles were very poorly built, and could not possibly meet requirements and stand up to their work. While there is a good deal of truth in this statement, when applied to the industry as a whole, it by no means offers an adequate explanation. In the earlier days, and they are not remote at this period of the history of the industry, much artistically decorated junk was sold under the name of "commercial vehicles." Crude contraptions, developed by wild-eyed inventors, were marketed as bound to work immediate and revolutionary changes in street transportation. To the initiated the only wonder was how they managed to move along under their own power when empty and yet hold together. And the light-hearted pleasure-car manufacturer, seeing an enormous outlet for his standard product in the business field, rushed into the market with a work body on a pleasure chassis and then rushed out again as unthinkingly. And meanwhile, the commercial vehicle builder, who had a proper appreciation of the difficulties of the problem and who was in very earnest to meet and overcome them, was suffering from a lack of practical experience and a total absence of that engineering data which in the older fields of applied mechanics has been accumulated and is available for translation into useful constructions. That these early and well-directed efforts did produce commercial vehicles of a thoroughly practical type is evidenced by the many old machines in constant daily service throughout the country. Machines that are unquestionably less efficient than those commonly produced to-day, but which, nevertheless, have accomplished a vast amount of useful work and have proved very remunerative investments, and after all that is the measure that the merchant or other user applies to any mechanism in his employ.

The foregoing is but a partial explanation, and refers entirely to the builder's share in the responsibility for the condition of dissatisfaction or distrust that we originally referred to. On the shoulders of the buyer lies as great a share of the responsibility. It is a matter of common knowledge among builders and their sales representatives to-day that it is extremely difficult to get the buyer and user to use even ordinary intelligence in the use and management of commercial vehicles. Looking at the problem of street transportation as a familiar one, the merchant is very likely to ignore the means in considering the result. Long and expensive experience in the maintenance of horsed vehicles has driven home to the merchant, or other vehicle user, certain truths and facts connected with the problems of stable management and road service by beast. And when the proposition to purchase inanimate machines, comes up the user or prospective customer rarely has any fund of experience to draw upon, and it is only natural that the instructions of the vehicle builder are ignored or forgotten. The buyer has no sense of proportion, no mental perspective. He is apt to magnify some triviality and to lose sight of some very important requirement of successful operation. And he is further handicapped by the scarcity of competent help, from the managerial positions down to the humblest helper on a wagon or washer in a garage. The natural result of all this is that commercial vehicles are more frequently abused than used, and it is always financially convenient and satisfying to one's self-esteem to make the builder the scapegoat.

It is not overstating matters to say that the situation would be one of discouragement to all engaged in the industry and to its supporters—the users—were it to be taken on its face value. Consideration of the underlying facts, however, not merely restores confidence but points to the ultimate development of the industry into one of tremendous proportions. And the fact (that by itself is a satisfactory answer to the whole problem) is that the present requirements of business in respect to street transportation are beyond the capacity of the horse. That being indisputable, all obstacles to progress will soon pass away. Among builders there will be the inexorable survival of the fittest—there is already a well-filled graveyard of commercial vehicle intentions. Performances will count in the final judgment. Among the users one may safely bank upon the progressiveness of the American business man and his admirable spirit of fairness. And as to the *personnel*, to which must be intrusted the use of machines, this will grow in numbers and skill as it has grown in such great departments of modern effort as railroading, electric lighting and, latest, pleasure car maintenance and operation.

INCREASING COST OF RUBBER

The very marked increases in the price of crude rubber with corresponding advances in the price of finished tires are attributed by H. S. Firestone, an anthority, to shortness in the actual supplies of gum that are inadequate to meet the tremendously increased demand for which the motor vehicle industry is chiefly responsible. He estimates that the total tire output of the present year will reach a value of $30,000,000, and that next year's production will bring the value up to nearly $50,000,000. "The rubber harvest has averaged an annual increase of only about 11 per cent. for several years, which is barely enough under normal conditions to keep pace with general business requirements," Mr. Firestone is quoted as saying. "It is owing principally to the recent large demand and to local conditions in the rubber districts that fine Para rubber has steadily risen from 67 cents a pound in February, 1908, to the record price of $2.15, which now prevails for immediate delivery. There is very little to be had, even at that price.

"Most of the rubber we use comes from the Para district up the Amazon River, where it is harvested wild, and from Ceylon, where it is gathered from extensive plantations. Some rubber comes from Mexico, Africa and parts of South America outside the Para district, but this is of inferior grade, and the motor vehicle world will eventually have to look to the rubber plantations to supply a large portion of the extraordinary amount required in the manufacture of high-grade tires."

It is conceivable that the price of crude rubber may reach such a figure that the cost of vehicle maintenance will become burdensome under conditions such as now exist. But such commercial conditions invariably stimulate invention to provide an alternative method, and it would appear that the development of spring wheels ought to receive a marked impetus. Already there are some promising types undergoing tests in practical service. It is hardly likely that, in the lighter models at least, the use of ruhber will be abandoned, for its qualities of adhesiveness and noiselessness are invaluable, but it is not improbable that a lesser amount of rubber may be effective with a resilient wheel than is now the case with the rigid construction, and in any event the life of the tire would be prolonged.

* * *

CONDITION OF CABS IN USE

Even casual observation of the taxicabs doing service in New York City reveals that not a few of them are already showing bad effects from use or abuse. Bent axles, bent steering knuckles, broken and bent fenders, dented and scratched bodies, crushed radiators and tail lamps, frames with a perceptible set under the dash—these and other evidences of congested traffic seem to point to a high rate of depreciation and diminished profits of the operating business.

Life of a cab chassis is usually figured at four or five years, making the allowance for depreciation 25 or 20 per cent. It seems doubtful if some of the cabs in New York would have so long a life even as the lesser of these periods. In England the life of a cab body is placed at three years, which raises the depreciation percentage somewhat.

Many of the cabs which show most plainly the effects of use are those operated by individual chauffeur-owners or stables operating only a small number of cabs of heterogeneous makes, and most of these are machines that have been merely adapted to taxicab work—that is, the chassis are simply runabout models fitted with landaulet bodies and by virtue thereof called taxicabs.

Drivers, of course, are responsible for most of the visible evidences of depreciation. Although damages due to careless handling are usually charged up to them, they "take a chance" when a "fare" who is in a hurry to reach his destination offers a large tip to the driver to get him there on time. As a consequence, they run too closely behind other vehicles and when the machine ahead stops abruptly and unexpectedly the radiator or fenders of the following cab are likely to suffer; or the driver stops too quickly without giving the required signal to a following vehicle and as a result has the shafts of a carriage or wagon pushed against the back of the body. The cabs are run at too high speed across car tracks and rough crossings and the axles, knuckles and frames are thus bent or broken. They have the wheels run against the curb in turning and the tires cut, knuckles bent and wheels put out of alignment. Innumerable other ills follow such careless handling, against which it is exceedingly hard to guard where it has been necessary to draft into the service such an army of raw recruits as the rapid growth of the taxicab business has made obligatory.

In the taxicab business, even more than in the old hansom and hack work, financial success must depend in considerable measure on the appearance of the vehicle to secure patrons. This is so well recognized that several of the large companies make a special point of keeping their machines as fresh, clean and in as good repair as private cars, and the drivers as neatly garbed and self-respecting in appearance and posture in the seat.

Several remedies against excessive depreciation suggest themselves. First, all machines intended for public cab service should be especially designed and built for this work; secondly, guard rails might be attached at front and rear to protect easily damaged parts; thirdly, the design might aim at the disposition of the radiator, tail lamp and fenders out of harm's way; fourthly, the machines could be geared and governed to make speed above a certain reasonable limit impossible.

* * *

Under the direction of Public Safety Director Jno. M. Morin, plans are being made to purchase a large number of motor cycles for use in saving lives in Pittsburgh. The plan is to station at the principal engine houses in all the main districts an expert lineman who can break all records in running a motor cycle to a fire. He will be provided with a long coil of rope attached to which will be a heavy weight, and it will be his duty to throw this rope into any window where occupants of the burning building are trying to escape before the regular firemen arrive. He will also carry a rope ladder with him to aid in escape.

A novel use for a motor coal truck has been made in Wilmington, Del., where a heavy vehicle operated by the Charles Warner Company has been in use as a passenger conveyance between the city and Brandywine Summit camp meeting, a distance of about eight miles.

MANAGEMENT OF ELECTRIC VEHICLE BATTERIES*

Practical Suggestions and Instructions for Those Who Have Charge of the Operation and Upkeep of Lead Storage Batteries—Lack of Capacity—Restoring an Old Cell—Abnormal Sulphating—Specific Gravity Readings

H. M. BECK

SHORT CIRCUITS BETWEEN PLATES

SHORT Circuits: Short circuits between the plates are largely eliminated through the use of the wood separator. This point therefore does not need any special attention beyond that of seeing that the separators are in good condition when installed. With the sediment under the plates, however, the case is different. It is a natural tendency to wish to run a battery as long as possible before putting it out of commission for overhauling. The result is that very generally the sediment is allowed to get up to the plates before the battery is washed. When the sediment reaches the plates, there is a discharge of wasted current through it, which in turn necessitates that the cell be given more charge in order to hold it up, and the extra charging again throws down still more sediment. Further, the sediment becomes sulphated, and by local action with the active material of the plates in contact with it, causes the active material to become sulphated, which again increases the tendency to washing out. The result is that the plates begin to lose their active material rapidly if the sediment is allowed to collect until it reaches them, and it is therefore evident that if a battery is to give its normal life, it is absolutely essential that the sediment be cleaned out before, and not after, it reaches the plates. The rate at which the sediment collects depends largely upon the way a battery is handled, and it is therefore necessary to determine this rate for each individual case. A cell should be cut out after, say, fifty charges, the depth of sediment measurer and the rate so obtained, used to determine the time when the battery will need cleaning. As there is apt to be some variation in the amount of sediment in different cells, and as the sediment is thrown down more rapidly during the latter part of a period than at the beginning, it is always advisable to allow at least one-fourth inch clearance. If the ribs in the bottom of the jars are 1¾ inches high, figure on cleaning when the sediment reaches a depth of 1½ inches.

Before dismantling a battery for "washing," if practical, have it fully charged. Otherwise, if the plates are badly sulphated, they are likely to throw down considerable sediment on the charge after the cleaning is completed.

LACK OF CAPACITY

There have been a great many complaints of lack of capacity from batteries after washing. Almost without exception, this is found to be due to lack of a complete charge following the cleaning. The plates are frequently in a sulphated condition when dismantled, and in any case are exposed to the air during the cleaning process, and thus lose more or less of their charge. When reassembled, they consequently need a very complete charge, and in some cases the equivalent of the initial charge, and unless this charge is given, the cells will not show capacity and will soon give trouble again. This charge should be as complete as that described elsewhere in connection with the initial charge.

"Flushing" or replacing evaporation in cells with electrolyte instead of water, is a most common mistake. The plates of a storage battery must always be kept covered with electrolyte, but the evaporation must be replaced with pure water only. There seems to be a more or less general tendency to confuse the electrolyte of a storage battery with that of a primary cell. The latter becomes weakened as the cell discharges and eventually requires renewal. With the storage battery, however, this is not the case, at least to anything like the same degree and unless acid is actually lost through slopping or a broken jar, it should not be necessary to add anything but water to the cells between cleanings. Acid goes into the plates during discharge, but with proper charging it will all be driven out again so that there will be practically no loss in the specific gravity readings, or at least one so slight that it does not require adjustment between cleanings. Thus unless some of the electrolyte has actually been lost, if the specific gravity readings are low, it is an indication that something is wrong, but the trouble is not that the readings are low, but that something is causing them to be low, and the proper thing to do is to remove the cause and not try to cover it up by doctoring the indicator. The acid is in the cells and if it does not show in the readings, it must be in the form of sulphate, and the proper thing to do is to remove the cause of the sulphation if there is one, and then with proper charging, drive the acid out of the plates and the specific gravity readings will then come back to the proper point. The too-frequent practice in such cases is to add electrolyte to the cells in order to bring up the readings, which as already explained, are only the indication of the trouble, and this further aggravates the condition, until finally the plates become so sulphated that lack of capacity causes a complaint. This practice of adding electrolyte to cells instead of water, seems to be becoming more and more common. In general, it is much the safer course to assume that the electrolyte is all right, and look for trouble elsewhere, than to attempt to doctor it by the addition of more acid, and a great deal of trouble to-day is the result of a misunderstanding of this one point.

RESTORING AN OLD CELL

The treatment required for bringing a low cell or battery back into shape, while quite simple, is one of the most misunderstood parts of battery operation. The causes of low cells may be very varied, but the results produced and consequently the treatment required, is not so varied. The general procedure is as follows:

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*From a paper read at the summer meeting of the Society of Automobile Engineers in Chicago. Continued from page 229, September issue.

First—Restore the cell mechanically.

Second—Renew the electrolyte if there is any question as to its purity.

Third—Restore the cell electrically by charging.

Before dismantling a cell, if practical, have it fully charged, the mechanical restoration then simply covers the operation of examining the cell and putting it as nearly as possible back into its original condition. This should not be difficult for anyone who is familiar with the assembly of the elements.

Where there is any question as to its purity, the electrolyte should be renewed, as the expense is not great in the case of the small cells used in vehicle service, and it would hardly pay to have an analysis made. Where any considerable amount of electrolyte is under suspicion, the manufacturers will gladly analyze the same. It is well to always have the water used for replacing evaporation and new electrolyte, unless furnished by the battery manufacturers, tested.

The most marked effect of an impurity is to cause the plates to become a bad color, the cells to become inefficient electrically and, in extreme cases, the plates may be ruined.

When the electrolyte is renewed, the jar and plates should be thoroughly washed and the new electrolyte should be of about the same strength as that renewed in order to allow for any acid which may be in the plates.

The electrical restoration has been probably the greatest stumbling block, and largely through lack of understanding, as this operation consists in simply charging the cell until a maximum voltage and gravity is reached. The common mistake is to cut off the charge before it is complete, in which case, the plates being still sulphated, will not show capacity and are likely through local action, to soon get into bad condition again.

TREATMENT OF ABNORMAL SULPHATING

With the possible exception of trouble due to an impurity, it can be generally stated that chemically the final condition requiring treating is abnormal sulphating, and even where an impurity is present in the electrolyte, its action is assisted by sulphating. It should be understood that sulphating is a normal as well as an abnormal process in the charge and discharge of storage batteries, and the difference is in the degree, not the process. The abnormal condition is that ordinarily referred to by the term. In normal service sulphating does not reach the point where it is difficult to reduce, but if carried too far, the condition becomes so complete that it is difficult to reduce, and injury results. A very crude method of illustrating the different degrees of sulphating is to consider it as beginning in individual particles uniformly distributed through the active material. Each particle of sulphate is then entirely surrounded by active material. The sulphate itself is a non-conductor, but being surrounded by active material, the current can reach it from all sides and it is easily reduced. This is normal sulphate. As the action goes further the particles of sulphate become larger and join together and their outside conducting surface is greatly reduced in comparison with their volume so that it becomes increasingly difficult to reduce them, and we have abnormal sulphate.

The general cure for sulphating is charging, so that a cell, having been mechanically restored, the electrical restoration consists simply in the proper charging. Sulphate reduces slowly, and on this account it is a good plan to use a rather low current rate. High rates cause excessive gassing, heating and do not hasten the process appreciably, so that it is the safer as well as the more efficient plan to go slowly. A good rate is about one-fifth normal. The length of charge will depend upon the degree of sulphating. In one actual case it required three months' charging night and day to complete the operation, but this was, of course, an exceptional one. The aim should be to continue until careful voltage and gravity readings show no further increase for at least ten hours and an absolute maximum has been reached. In serious cases it may be advisable to even exceed this time in order to make absolutely sure that all sulphate is reduced, and where there is any question it is much safer to charge too long, rather than to risk cutting off too soon. A partial charge is only a temporary expedient, the cell still being sulphated will drop behind again.

ON SPECIFIC GRAVITY READINGS

Since the specific gravity readings are affected not only by the charge, but also by the evaporation and changes in temperature, it is advisable, where an absolute maximum is to be reached, to eliminate these. The evaporation should be replaced with sufficient frequency to keep the electrolyte accurately at a fixed height above the plates. In this way water is added so frequently that very little has to be added at any one time, and the effect on the specific gravity readings is negligible. The temperature variations are eliminated by reading the temperature of the electrolyte, when specific gravity readings are taken, and correcting the latter to some standard temperature, such as 70° F. This correction is made by adding one point (.001 specific gravity) for every three degrees above 70° F. and subtracting one point for every three degrees below 70° F.

When the charge is complete the specific gravity of the electrolyte should be adjusted to the proper point and the cell is ready for service. Where there is time, and the facilities are at hand, it is a good plan to take a test discharge in order to make sure that everything is all right.

Failure in the restoration of low cells is probably more often due to cutting off the charge too soon than to any other cause, and from the troubles, which are being reported, this point evidently needs to be brought out more strongly.

BLAME IT ON THE BATTERY

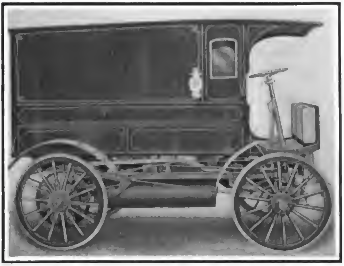
In closing, a word or two about the vehicles themselves. As manufacturers we wish to admit without argument that the battery is the most important part of the vehicle, but, on the other hand, we would like to protest against the frequent practice of blaming the battery for everything that goes wrong. The battery is rated in ampere hours, not mileage, and when the mileage of a vehicle falls short, trouble should be looked for in the vehicle as well as in the battery. Batteries are regularly rated at their four-hour discharge rate, this being about an average running rate for vehicles. The capacity, however, varies widely with different discharge rates, decreasing as the rates increase, so that anything which causes the vehicle to consume more current, will more than proportionately reduce its mileage. For example, suppose that due to inefficient tires, poor bearings or binding brake, a normal current of twenty amperes is increased to thirty amperes. If the ampere hour capacity were still the same, and there were no other losses, the mileage would be reduced about one-third. This increase in current, however, reduces the actual capacity of the battery by about ten per cent. The average discharge voltage is also reduced and the drop in wiring of the vehicle is increased, so that the watts delivered to the motor are still further reduced, and finally the motor itself is somewhat less efficient at the higher rate, so that the net result is that the mileage of the vehicle instead of being reduced by one-third, is actually cut down by about one-half. It is thus evident how important it is that the vehicle as well as the battery be kept in the best of condition.

As has already been stated, no attempt has been made to cover many of the details of battery operation, but rather to emphasize and explain some of the most common errors found in the handling of the vehicle batteries of to-day and of these, probably that which should be brought out most forcibly is the matter of flushing cells with electrolyte instead of water. Keep the plates covered with electrolyte, but use only pure water, not acid, for replacing the evaporation.

BRODESSER LIGHT MOTOR WAGONS

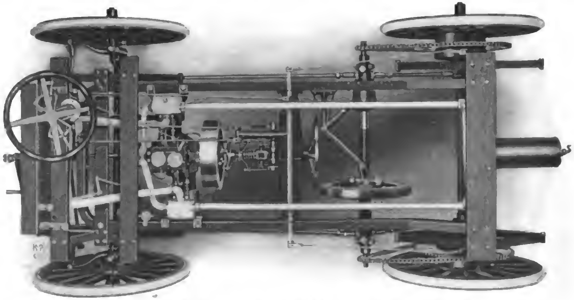
In the belief that better results can be obtained by concentration of effort on two models of commercial vehicle than by spreading their energies over a wide variety of types the manufacturers of the Brodesser motor trucks, P. H. Brodesser & Company, of Milwaukee, have marketed only vehicles with a capacity of 1,200 pounds and 2,000 pounds, respectively. These wagons are of simple design, being fitted with horizontal opposed motors, change-speed mechanism of the friction type, and side chain drive to the rear wheels.

The lighter wagon has an angle-iron frame 3 inch by 2 inch by ¼ inch, full elliptic springs, 40-inch wheels in front and 42-inch in the rear. The tires are 2-inch side wire. Wheel base is 88 inches. The motor has two cylinders, is water cooled and governor controlled, and is rated at 18-20 horsepower. The friction change speed gear is of the two-disk type, the driving member being carried on the engine shaft and the driven wheel is carried on a countershaft set across the frame and fitted with the chain driving sprockets on the outboard ends. Powerful emergency brakes are fitted to drums on the rear wheels. The gasoline tank capacity is 12 gallons, and the fuel consumption gives about 10 to 12 miles to the gallon, the speed range varying from 3 to 12 miles an hour. When fitted with open body the weight of this vehicle complete is about 2,000 pounds.



BRODESSER WAGON BUILT IN MILWAUKEE

The larger wagon is of the same general design, but is fitted with a four-cylinder opposed motor rated at 24-26 horsepower, and Remy magneto for supplying current for the ignition system. The speed ranges of this model are between 3 and 14 miles an hour. The weight of the complete vehicle is about 2,350 pounds.



PLAN VIEW OF CHASSIS OF THE BRODESSER FRICTION-DRIVEN DELIVERY WAGON

In its details of construction the friction gear is quite simple. The driving disk is heavily ribbed and is carried on a shaft provided with long bearings. Its face contacts with the fiber rim of the driven wheel, that slides transversely—with relation to the frame—on the countershaft which is fitted with a feather key. By an arrangement of suitable levers controlled by the driver's handle the position of the driven wheel can be altered relative to the center of the driving disk, so that all speeds from zero to maximum can be instantly obtained, in either the forward or reverse direction, without any clashing of gears or clutch release. In addition to the regular normal contact pressure used in driving there is an auxiliary pedal by which the driver can exert more pressure between the friction wheels in heavy pulls, as in starting under load or ascending steep grades.

Many different types of body are made by the builders but if the purchaser so desires the chassis will be delivered without any body. All vehicles shipped out are guaranteed for one year.

COLLECTION AND DIFFUSION OF TECHNICAL DATA*

Suggestions for the Extension of the Melvil Dewey System of Indexing Notes and Clippings to Cover the Needs of the Motor Vehicle Engineer—Uniformity of Methods Would Facilitate Exchange and Loan of Records

HENRY HESS

THERE is probably no professional or business man, teacher or student, that has not felt the desirability, or rather the need, of preserving for future use that knowledge and recorded experience brought him by the professional journals. Much of this is later made available in books and works of reference, but those, by their very nature, must lag behind and must sacrifice much to condensation.

Out of this need have arisen many methods and systems of arranging and filing information beyond the storage ability of memory.

The first attempt will have been the pasting of cuttings into paged scrap books, coupled with a tabbed note-book index. As the wielding of the paste-brush became irksome, clippings were filed in envelopes and these in boxes, etc. As these filled up and the proper alphabetical note-book index lost order, rewriting or the card index had to be resorted to.

There remained the difficulty of finding a note or clipping, since the chances were that it was indexed under a title not occurring to the eager hunter for information at the time of the search. The remedy was manifest and simple—cross reference. That afforded a fine opportunity for increasing one's vocabulary by finding synonyms and offered also healthy mental exercise in regarding a subject from various angles, also a glow of exultation and pride in the ability to find a dozen or two of cross-references for each thing indexed. Unfortunately the labor involved became greater and greater as time went on, while enthusiasm waned in inverse ratio. Then, too, when looking up any given subject there was the work of having to gather the notes from various places indicated by the index, provided, of course, that their hiding place was revealed by consulting the index under the particular heading or cross-reference in mind at the time of making the entry. After that there was the laborious task of again properly distributing each note, clipping, etc., to its own particular lodging place.

It was the inadequacy of all of these methods that led a former director of the New York State Library, Melvil Dewey, to devise a new arrangement. He divided all knowledge into a series of broad classes, assigning each a number, 0 to 9. Each of these broad classes was again subdivided and each such subdivision again assigned one of the numbers from 0 to 9.

It is apparent that this subdivision can be carried on indefinitely. For purposes of convenience a dividing period is placed after each third figure. This looks formidable in the description, but is really exceedingly simple.

One engineer will be interested in many lines, will accumulate matter along all of these, the greater part naturally relating to his specialty. He will mark each note preserved under its Dewey number. Matter in Chemistry will be 540. Matter on Steam Engineering will be found under 621.1. In the last line he is apt to accumulate sufficient matter to make further subdivision advisable. He does that by adding figure 1; 621.11 means Mechanism of the Steam Engine—Design of engine parts. Adding 2 instead gives 621.12 Marine Engines and Ship propulsion. As our engineer is interested also in Transportation he finds that is assigned number 656; accumulating notes in quantity on this general subject further, classification by number extension gives 656.2 for Transportation by Railways; 656.3 656.2 for Transportation by horseless vehicles, etc., while 656.32 refers to Automobiles. Further subdivision goes on as far as detail subdivision may become desirable, without any change, merely by hanging on additional numbers.

All matter filed away in numerical order. In that way our engineer wishing to consult his accumulation on chemistry need go to only one place, indicated by 540. Should he wish to refresh himself on Transportation by means of Automobiles, he will not have to wade through his whole accumulation on Transportation under 656, but will find in its numerical order and consult only everything numbered 656.32. When through, he or anybody for him capable of reading numbers, can put everything quickly back in its numerical place. Similarly an instruction to the office-boy to pick out the complete bunch under 656.32 will bring to hand all notes on this subject. Under any other known method a fairly well-trained and high order of intelligence would have to be called on to bring all of this matter to hand.

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*From a paper read at the Chicago meeting of the Society of Automobile Engineers.

THE RELATIVE INDEX

But it is necessary to know the classification number for any given subject. A so-called "relative index" is used. That is an alphabetical index with the classification number given. At first sight this seems to lead back again to the alphabetical index from which escape was sought. Not so, however, there is never any difficulty in finding the broad subject under some name or other that will come to mind naturally to anyone even superficially familiar with that subject. The index number itself then gives the clue to detail classifications, by looking up these in the "numerical extension."

Dewey started this work for his needs as a public librarian; it was extended by other librarians; a further extension to the engineering industries was made by Breckenridge and Goodenough and published by the University of Illinois.

One great advantage of this Dewey system is thus illustrated by the way it permits of continued extension to take in more and more detail by building on to previous work and without need for change of the previous work.

This brings me to the title of this paper, a matter that I have long advocated in a general way and that I believe would greatly benefit every engineer in every possible field, nay more than that, would benefit every human being seeking to profit by the accumulated experience of mankind as laid down in print.

While the individual can classify his own accumulations by this Dewey method, he can benefit by the accumulation of others only when their accumulations also are indexed, not merely by the same system in general, but under the same numbers. Partly this is the case to-day, since a number of libraries, universities and colleges have adopted the same index.

CO-OPERATION OF TECHNICAL SOCIETIES

The full realization of possible ultimate benefits can be had only by co-operation. The base for such co-operation is best laid in the various professional societies. Let us take our own Society of Automobile Engineers. Say that the task of extension of the index to our direct field beyond the limits of the index appended to this paper be assigned a committee. To each member would be assigned some one subject. Say one to extend 656.322, Motive Powers, another 656.323 Principal Parts, etc. The work is not difficult. In getting up the appended index extension, cuttings, notes, etc., as they accumulated were given the main number 656.32. As these accumulated, they were from time to time assorted into more detailed groups and an extension number assigned each group. The appended extension is thus the growth of several years; the work involved was not more than a couple of hours per month. The actual work is very simple, since no logical arrangement is needed in the assignment of numbers; in fact, it is desirable to get away from any idea of logical sequence or relationship of subject as reflected in the numbers: what might appear as a very logical arrangement to one person would be not at all so to another that approached the matter from a different angle. There could, therefore, never be any wide agreement on any basis of logical sequence. Let it once be recognized that the numbers of the classification are mere location numbers and this difficulty disappears.

The committee would each six months submit its extension and this be examined by the chairman to avoid any possible overlapping. The extension would then be recommended for general use and be made available through our publications.

TO AVOID DUPLICATION

The next step would be the co-operation of the various engineering societies, each taking up a special division most in accord with its field. That would avoid duplication of effort, overlapping and confusion. Each society would suggest to its members the advisability of using the index for their individual accumulations. Each would further suggest to its members that they bequeath their accumulations to the society. In this way there would gradually come to each society a great body of fully and uniformly indexed, and, therefore, immediately available, material. As it is now, such bequests are more often a source of embarrassment than anything else, since the work of reindexing is quite beyond the capacity of any society's library staff. Most of such bequests, therefore, find their way into the storerooms, there to accumulate dust, excepting, possibly, an occasional volume or two, valuable simply for its rarity. The far more useful, because live material cannot be used. On the other hand, did that come in, properly indexed under the adopted classification, it could at once be placed on the shelves in its proper place. Naturally much of such matter would be duplicated. That would not be a detriment, on the contrary it would open up an additional and very wide field of usefulness. As it is now, the library of any of the societies, small or large, is available only to the relatively few able to actually visit it and spend time and make notes in the library's rooms during library hours. Those most in need of the library, have, therefore, the least opportunity to avail themselves of it. But with the accumulation of duplicate matter, resulting from the suggested plan, it would be desirable to keep on the permanent shelves only one copy. All of the remainder would be available for lending out. Say that some member of our society, or of a society exchanging privileges with ours, wants to inform himself fully on the subject of carbureters for internal combustion motors. Writing to the society would bring in return one of the duplicate sets of everything under number 656.322.11 and at no cost to him beyond that of expressage both ways and involving no obligations beyond return by a prescribed time. Even the loss of a part of this matter would not be very serious, as its duplicate would be on the permanent shelves.

The plan outlined, adopted by professional societies and journals, would shorten greatly the road to the goal of "the wider dissemination of professional knowledge and experience."

The estimated annual outlay on maintainance and repair of the main roads in England and Wales for the year ending March 31, 1909, amounted to $13,800,000, in round numbers. This sum covered a mileage 27,600 miles of road, the rate per mile being about $501.

Baron Goto, Minister of Communication in Japan, is reported to be investigating the transportation of mail by motor vehicles in the principal cities of Japan.

The Commercial Vehicle

Vol. IV December 1909 No. 12

AMERICAN EXPRESS SERVICE IN NEW YORK

Trials of Electric and Gas Motor Vehicles Covering a Period of Several Months Show Vehicle Economies and Result in a Decision to Extend the Motor Vehicle Service—Equipment and Operating Conditions

AMONG the most extensive users of motor trucks and wagons in New York City are the big national express companies. Of these, the Adams company is the largest and earliest user and the American ranks second in point of numbers in service. The United States also uses a number of electric wagons, and the Westcott Express Company, which is a subsidiary branch of the American, has recently adopted motor baggage wagons on a limited scale. The Westcott has the exclusive contract for handling the baggage received on incoming trains of the New York Central and the New York, New Haven & Hartford lines. The American handles all the express matter arriving at and departing from the Grand Central Station, used jointly by these two railroad systems.

LOADING AN ALCO TRUCK AT ONE OF THE AMERICAN EXPRESS COMPANY'S STATIONS

After having used five electric vehicles for more than fifteen months and fifteen 3-ton gasoline trucks for nearly nine months, the management of the American company is very well satisfied and is contemplating a more extensive use of motor vehicles in the future. Complete records of the operation of the machines and of the costs of operation and maintenance are being kept, with the result that up to the present time the motor wagons show about 30 per cent greater work capacity than the horses and wagons used by the company, while the total expense for operation and upkeep has been just about the same for a three-ton motor wagon as for a three-ton horse wagon and the four horses, or two teams, for hauling it. The horses are changed at noon, one team working half a day and resting the other half.

HOUSING THE MOTOR WAGONS

The motor wagons are kept in the basement of the company's stable at 217 and 219 East Forty-second Street, which has been converted into a garage. The space occupied is charged as rent against the trucks, which are also charged up with their proportionate share of the expense for lighting, elevator service, attendance, etc. This close accounting is being kept with the object of determining the policy of the company with regard to further adoption of motor vehicles to replace its horse service.

The electric equipment consists of one 1-ton, one 2-ton and one 3-ton General Vehicle Company wagons, and one 1-ton and one 2-ton Baker Motor Vehicle Company machines. The 3-ton General Vehicle Company truck was received in June, 1907, and the rest of the wagons were put into service in July, 1908.

These electric wagons are used exclusively in the work of distributing express packages from the main depot at Madison Avenue and Forty-seventh Street, adjoining the Grand Central Station. They have been found ideal for this work, in which a limited mileage is needed and stops are frequent. As compared with the gasoline cars, the cost of operation is slightly in their favor. They are operated, however, only on Manhattan Island, and do not run above One Hundred and Tenth street. They average thirty miles a day and make an average of 60 stops for deliveries. This does not exhaust their battery charges, however, as on a test one of the Baker wagons has been run 55 miles on one charge, and all the wagons will run 35 or 40 miles on a charge, it is reported. For distribution work, 30 miles is sufficient, because of the many stops that must be made.

Reversing the custom of the department store and dry goods house, the express company requires its drivers to make the deliveries of packages to consignees, and sends a helper along merely to watch the wagon and its contents and to assist the driver in handling heavy packages, and in other ways. This is done because the company is handling property that belongs to other persons, and is responsible for losses and breakages. Consequenty, it makes the man who has charge of the wagon and receives the larger wage, also responsible for the goods.

AMERICAN EXPRESS WAGON COMING OUT OF LOADING DEPOT AT GRAND CENTRAL STATION

ELECTRICS ONLY IN DISTRIBUTION WORK

Although the company has not yet tried one of its gas motor trucks in distribution work, it is believed that the electric is economically superior in this service because of the tendency of the driver to allow the gas engine to run when the truck is standing during the period required to deliver a package from the vehicle to the consignee. With the electric there is no expenditure of energy and no wear on the operating parts during this time, which in the course of a day amounts to considerable.

It was on March 8, 1909, that the first of the fifteen American Locomotive Company 3-ton gas trucks was received. After that the rest came along at the rate of about two a day, until all had been delivered before April 1. These machines are used almost exclusively in transfer work; that is, in carrying loads of express packages between the stations of the American company, at which points they are collected and distributed by horse-drawn wagons. An elaborate schedule of daily trips has been worked out for their operation by Superintendent Christie and Assistant Superintendent Balfour. It is similar to a railroad train schedule, with the time of departure of each truck from each station indicated. Each driver has a number and carries with him a typewritten slip showing at what stations he is to call and the time of leaving each. Each agent at the different stations or depots has a sheet or series of sheets, typewritten, showing the schedules of all the drivers and all the stations. He is directly interested, however, only in the times of call of the different drivers at his own station, but must see that all packages for the route to be followed by each wagon are ready when the wagon calls. Thus, the wagons running between the Madison avenue station and the station in East New York follow two routes, one of which includes a stop at the Dock street station in Brooklyn, while the other does not. Any packages for the Dock street station must, of course, be sent on a wagon that makes the call there.

STATIONS SERVED BY MOTOR TRUCKS

The stations served by the motor trucks are as follows:

Bronx Park (at Webster avenue and One Hundred and Ninety-eighth street).

Park avenue and One Hundred and Thirty-eighth street.

Madison avenue and Forty-seventh street (the main depot).

Long Island City (at 116 Vernon avenue).

Lee avenue (Brooklyn).

Dock street (Brooklyn).

East New York (Atlantic and Alabama avenues, Brooklyn).

During the period from 5 o'clock a. m. to 7.30 p. m., there are 28 trips by motor truck from the Madison avenue depot. After that hour in the evening there is no schedule, the wagons being run as needed and according to the amount of express matter to be handled. The schedule is arranged with the object of connecting with incoming and departing trains on the New York Central lines. There are frequent trips in the morning, at noon, and again between 5 and 6 p. m. For instance, at 7.20 a. m. four of the big 3-ton trucks leave the express shipping room at the same time, going to different sections of the city. Again, at noon, there are four trucks loading at once.

Each truck is worked 20 hours out of the 24, when the work is heavy; that is, the schedule calls for two hours out of every 12 to be spent in the garage, during which times the machines are inspected and cleaned. A double shift of drivers is worked on each machine, one man going on about 5 o'clock in the morning and the other at about the same time in the afternoon.

Twelve miles without a stop is the longest drive—from Madison avenue to East New York. The schedule calls for five trips a day over this route. They are made by different trucks and different drivers, as the system requires a regular interchange of machines on the various routes. The running time between the two stations is 1 hour 10 minutes. The time required by horses to cover this route was three hours, and then it was necessary to use a relay of horses for the return trip. So it will be seen that the regular running time has been cut down to only about 35 per cent of what it would be with horses. Besides this, there is a great saving in trouble due to the changing of animals.

Next to the East New York run, that to the Bronx Park station is the longest—ten miles.

THE QUESTION OF DRIVERS

Drivers handling the motor trucks were formerly drivers of the company's horsed wagons, who have been broken in to operate the motor cars and receive the same wages as formerly—$65 a month. They are not expected to have a mechanical knowledge of the machines nor to attempt to make repairs or adjustments on the road. Their instructions are to telephone in to the garage for the emergency wagon in event of a stoppage. However, under the tutelage of an instructor regularly employed for the purpose and assigned to the superintendent's office instead of the garage force, they have acquired considerable knowledge of the engines and other mechanism, and do occasionally get themselves out of trouble instead of calling the emergency wagon and mechanician.

It is the duty of the instructor to accompany a new man on the truck and show him how to run it. He also rides with different men after they have been broken in, to watch the action of the engine and machine and make adjustments or report to the office on any attention required by the machine. Under his guidance and reports the drivers are constantly picking up points in the running of the machines and the trucks are kept up to the best operating efficiency.

With respect to the Alco trucks and their work, Mr. Balfour said to THE COMMERCIAL VEHICLE representative that the management thought their equipment had no superior in the city, the trucks being excellently made and most suitable for the work. With the engine directly under the footboards and the seat above, the trucks have a short overall length and the load is well divided between the front and rear axles. Their performance had been better than was anticipated, he said, and while not willing to give out for publication any of the figures relating to expense of operation and maintenance, he was positive the cost per truck was just about the same as for a wagon and the four horses needed to draw it for a day. The one item that the company cannot learn except by the lapse of time, is that of depreciation or life. How long a motor truck will last on the average can be learned, of course, only by experience covering a period of probably from five to ten years. The company, however, is well satisfied with the results obtained, and its action with regard to future additions to the service is likely to be favorably influenced by its experience covering the last two years.

Emergency motor trucks, fitted with alarm bells and gas lights, which will be kept burning all night, are to be installed by the Pacific Electric and Los Angeles Railway Company's repair forces. Three Frayer-Miller trucks have been purchased. One of the big trucks will be used in Pasadena on the Pacific Electric lines there. Another will be used on the Pacific Electric lines in Los Angeles. The third truck will be housed in the barns of the Los Angeles Railway Company.

The Pennsylvania Railroad Company has purchased a gasoline motor car from Fairbanks, Morse & Co., of Chicago, which will be placed in service on the Smyrna branch, between Smyrna and Clayton, Del. The new car is 33 feet over all, painted the standard Pennsylvania color. The body is semi-convertible type, having two compartments. The front compartment, in which the engine is located, is 11 feet long and can be utilized for handling light baggage and express. The rear compartment is 18 feet long and seats about 30 people. The engine is four-cylinder, four-cycle, water-cooled. It is rated at 50-60 horsepower. The car is built to run in either direction without turning and has control mechanism at each end. The drive is by roller chains to the front axle. The car is equipped with air brakes on four wheels. A gasoline tank of 50 gallons capacity is located underneath the body of the car.

ELECTRIC VEHICLE CONSTRUCTION AND OPERATION—VII*

An Elementary Discussion of the Principles Employed in the Production of Electric Current by Mechanical Means--Similarity of the Direct Current Motor to the Direct Current Generator

LOFTUS G. COADE

IN dealing with the construction of electric motors, it would be wise to first consider some of the fundamental principles which govern the subject of dynamo electric machinery. Confusion frequently exists in the minds of nontechnical readers as to the exact meaning of the terms, dynamo, electric generator and electric motor. Now a dynamo or generator is a machine for converting the mechanical energy received from a steam or gas engine or other source of power into electrical energy. An electric motor is the converse of this, that is it receives electrical energy and converts it back into mechanical energy.

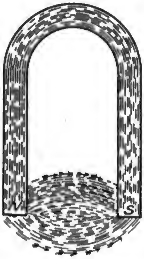

FIG. 1

We will first of all begin with the theory of the generator, in its elementary form, and see how an electric current can be developed in its conductors by the application of mechanical power to its shaft. Most people are familiar with the term, load stone, perhaps more so in its form of the horseshoe magnet. Such a magnet is made of steel and possesses the property of attracting and holding pieces of steel or iron to its poles with considerable tenacity. If we hold a compass close to the poles of a magnet we shall observe that the south pole of the needle is attracted by the north pole of the magnet and vice versa. From this we can infer that there is an invisible magnetic current passing from one pole to the other. The direction of this flux, as it is termed, would be somewhat after that shown in Fig. 1.

These lines are called lines of force. The number per square inch, measured across the pole face (which number can be measured figuratively speaking), determine the strength of the magnet, and the more there are the stronger will be the pull. Permanent magnets, however, are not used except for magnetos and electrical instruments as we have other means of producing a much stronger magnetic field, for such the path between the two poles is termed.

It was stated in a former article, that, when an electric current was passed through a wire, similar magnetic lines of force were set up concentrically around that wire. If we find this wire in the form of a coil or helix, it will be found that the magnetic pull is now very much stronger and has the property, as it were, of sucking a rod of steel or iron into the coil, and the coil or metal rod, whichever is free to move, will eventually assume a position with the coil resting about the middle of the metal, called the magnetic center, see Fig. 2. The flux from the poles is now even stronger still than that of the plain wire coil or solenoid. The intensity of this magnetic flux, induced by the current in the iron core, depends upon the product of the number of turns or convolutions of the wire multiplied by the number of amperes passing through the coil. This product is termed ampere turns; so that if with a current of 100 amperes passing through a coil having, say, ten turns, making a total of 1,000 ampere-turns, we produced a field of a certain strength, we could produce exactly the same strength by using say 100 turns with ten amperes or any other combination so long as the product or ampere-turns remain unchanged. It is possible by certain scientific instruments to measure the density of magnetization in iron so excited, and different grades of iron do not exhibit the same magnetic intensity under similar conditions. Thus, wrought iron will be found to have nearly twice the intensity of common cast iron. There is a certain point, however, beyond which where a considerable increase of magnetizing power produces practically no resulting increase in the number of lines of force, and when this point is reached the iron core is said to be saturated. In order to get the greatest amount of power from a given weight of metal it is usual to drive the magnetic flux somewhere near this saturation point.

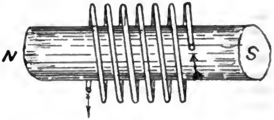

FIG. 2

TO PRODUCE AN ELECTRIC CURRENT

Now in order to produce an electric current from a magnet we must cut these lines of force by means of a conductor. Fig. 3 will better explain what is meant by the cutting of these lines of force. It shows the poles of a magnet between which a strong magnetic flux is passing. In the center of the space between the two poles is a cylindrical iron core, with a shaft (not shown on sketch) extending through its center and free to revolve between the poles without touching them. Now along this core, and parallel to its axis, is shown one conductor for simplicity. This core when wound complete with all its conductors is called the armature, and the path traversed by the current is called the internal circuit of the machine. The magnetic flux passes from the north pole over the air-gap, as the small space between the pole and the armature is called, through the armature core to the south pole. Now it will be seen that as the path of the conductor is at right angles to the path of the magnetic flux, revolving the armature will cause the wire to cut, as it were, this flux. This cutting creates an electromotive force—usually abbreviated, as e.m.f.—in the coil and if it could be rotated fast enough to cut one hundred million lines of force in one second it would generate a pressure equal to one volt. Such, however, would be impracticable in the machine as illustrated. So in practice the core is wound all over with many turns of wire all in series so as to reduce the speed.

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*Continued from page 255, October issue.

Now in order to allow current to flow we must provide some means of collecting it and also a path for it to flow through. No water will flow through a pipe which remained closed at either or both ends. So each half of the armature coil is joined to what is called a commutator. This consists in the elementary sketch given, of a piece of copper or brass tube, split down longitudinally, each half being insulated or separated from the other. Resting on each segment are strips of copper called brushes which in turn are connected through a resistance (a lamp in this case to illustrate the idea better), and constitute the external circuit. As the armature is rotated rapidly between the poles, an e. m. f., as before, is generated which, following the laws of the current, causes the same to flow out of brush at *N*, pole side, called positive, through the lamp or other resistance into the negative brush at the south pole. In the sketch the positive wire is shown as it has just finished cutting the lines of force emanating from the north pole. Now when it passes over and begins to cut the flux on the south pole side conditions are reversed and the current flows in the opposite direction through the armature. Such reversals are called alternating currents. But as the section of the commutator connected to this side of the conductor has also revolved round to the other brush the current in the external circuit will still flow in the same direction and is thus called direct or continuous current. So the function of the commutator besides furnishing a path for the brushes to collect the current from the conductor also serves to keep the current flowing in the same direction continuously.

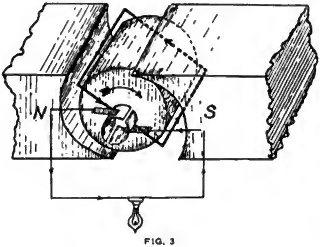


FIG. 3

RISE AND FALL OF VOLTAGE

With such a machine as described it can be seen that the voltage would rise from zero to maximum and fall again as the conductors passed in and out of the magnetic field, which, of course, would be useless for power or lighting purposes; besides the output would be far too small to be of any use. So in practice armatures have a great many coils, each coil having several turns so that the total number of turns may run into many hundreds, depending, of course, on the type and size of the machine. Similarly the field strength is increased by having four, six or eight, or more, poles. When a designer sets out to design a new machine, the first thing he proceeds to do is to assume a certain number of lines of force, per square inch, over the pole faces. From this he calculates the number of ampere-turns required on the poles in order to give him such a desired flux. Then knowing the speed the machine is to be driven at, he figures out how many turns of wire are required on the armature to cut these lines of force to give the desired volts at a given speed.

The current output or capacity is determined by the rise in temperature allowed, which rise is due in turn to the resistance of the wire, so the heavier the current the larger the size the wire must be, and the slower the speed the more wires there must be on the armature. This will explain the reason why slow speed machines are more expensive than those of high speed for the same output. Dynamo design is not quite so simple and there are several other contingencies to be calculated and allowed for, but the foregoing in the main explains the method of arriving at the necessary data required before building.

EXCITATION OF THE FIELD COILS

Except where generators are required for special purposes the field coils are excited from the current developed by the armature. There are three different methods of doing this. Figs. 4, 5 and 6 show diagrammatically each method, in which the circles represent the commutator, with the brushes resting on it, while the zig-zag line represents the convolutions of wire around the pole pieces.

The series method, Fig. 4, shows the simplest method of doing this. Here one brush is directly connected to the field terminal, and the load is also in series and connected to the other end of the field. Consequently the more current passing through the armature the stronger the field strength will be. It is not much used now for generators, and then only for those of the constant current type for arc lighting. But it is used almost entirely for motors of railway types, and for those of motor vehicles, which will be considered in detail later.

Fig. 5 shows the second type, called shunt winding, because the field is connected across the brushes, and thus forms a bypath way or shunt for the current. On examining this method it will become evident that with a constant voltage at the brushes the field strength will also remain the same. This it does, except that when a very heavy external load comes on, the field will weaken, as its resistance is very high. In order to prevent such a dropping off of the field with its attendant loss of voltage recourse is had to compounding. Fig. 6 shows a compound winding; here in addition to the shunt winding an extra series winding, consisting of a few turns in series with the armatture, is put on, so that no matter what the load may be these extra turns carrying the whole current will compensate for the loss in the shunt winding. All generators now for heavy duty are compounded as discussed, and very frequently overcompounded so the voltage will rise with the increased load in order to allow for the drop in the feeders, where the distance in transmission is considerable.

DIRECT CURRENT MOTORS

Now in so far as the electrical features of a direct current motor are concerned, they are practically the same as those of a direct current generator. As a matter of fact the principle of the motor was known long before that of the generator, only its use was confined to that of laboratory experiments, on account of the high cost of supplying current from primary batteries. It has been shown that as an electric current is generated by the moving of a conductor placed in a magnetic field (and at right angles to the path of the lines of force), so it is that when a conductor similarly placed and supplied with current from an external source will tend to move away from the field, owing to the reaction set up between the two.

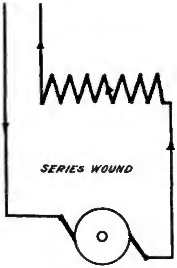


FIG. 4

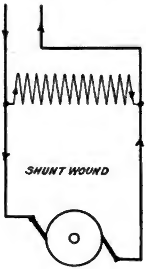


FIG. 5

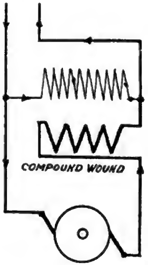


FIG. 6

The force tending to move this conductor supplies in a mechanical form the energy supplied to it electrically from the generator, or battery, as the case may be. And further than this, neglecting some small losses which are unavoidable, it will give out nearly the same horsepower that was originally taken from the engine or other prime mover. The greater the amount of current taken from the generator the greater the reaction set up by this current on the field, causing a greater pull on the engine in exact proportion. So in the case of the motor the greater the pull required on the drive, the more current will be needed to supply the necessary torque action between the field and armature.

Considering further the action of a motor and its similarity to that of a generator. Here we have exactly the same conditions necessary for the generation of an e.m.f., viz., a revolving armature carrying the conductors necessary for cutting the lines of force. There actually is developed what is called a counter e.m.f., that is it tends to flow in the opposite direction to, and thus opposes the current from, the supply line. Now this is very important, for all armatures are of low resistance, and if it were not for this fact a motor would simply act as a bad short circuit and speedily burn out. Take the case of a shunt motor, where the field is excited at a constant strength, supplying current to the armature without any load on the motor will cause it to speed up till its conductors cut the necessary number of lines of force needed to develop nearly the same voltage as the line, and it will continue to rotate constant at that speed, the slight difference between the two e.m.f.'s being used in forcing the necessary amount of current needed in order to set up the required reaction. Now, as the load comes on, the armature will slow up somewhat, causing the counter e.m.f. to drop off a little more below that of the line and more current flows into the armature, and so on until the armature is carrying as much current as it can without heating too much, and which heating limits the output of the motor.

The reaction between the current in the armature and the field produces a movement of the former which might be better termed torque or a twisting effort on the shaft. This torque is present on direct current motors whether they are moving or not when the circuit is closed, as will be found by trying to hold the armature still and turning the current on; if it were not for this fact electric motors could not start under load and would have to be cranked like gas engines.

(To be continued.)

Four Autocar motor vans have been substituted for eleven horse-drawn mail wagons in Philadelphia. After an official inspection by Postmaster Richard Ashhurst and a number of department officials, the motor vehicles were put into service and have already shown their superiority over the horse-drawn vehicles in the collection and delivery of mail. Since power-driven trucks were installed in the mail service at Baltimore and Washington, Postmaster Ashhurst has been conferring with the Washington postal authorities with the idea of having them introduced in Philadelphia. The four trucks now in service are regarded as an experiment, but Mr. Ashhurst hopes to have several more at work soon.

ANNUAL COMMERCIAL VEHICLE TRIALS IN FRANCE

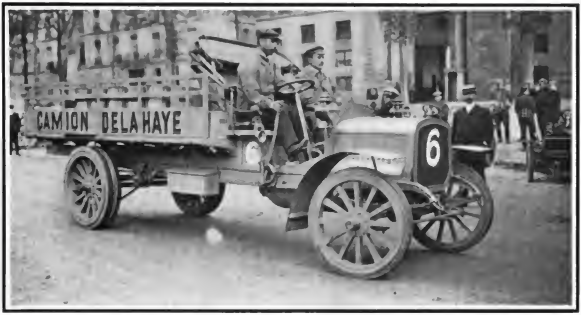
More than Fifty Machines, Including Delivery Vans, Light and Heavy Trucks, Road Trains and Omnibuses, Take Part in the Civil and Military Competitions—Formula Adopted for Making Awards

THE 1909 French commercial vehicle trials were concluded on November 15, having occupied almost thirty days in trying out the various types of machines entered. This year the trials were carried out under the joint supervision of the Automobile Club of France and the French War Department. It was optional with the manufacturers whether they would enter their vehicles in one or other of the competitions—civil and military—or in both, as for the most part the trials were held simultaneously. The plan of establishing a central starting point, from which various selected routes radiated, was followed and the old royal city of Versailles, near Paris, was made the headquarters. There very extensive garage accommodations were provided for the machines entered, and these were under the most rigid military supervision so that the rules prohibiting repairs and adjustments to the machines when not in operation were minutely carried into effect.

SAUER INSIDE OMNIBUS—VEHICLES OF THIS MAKE WON HIGH HONORS IN TRIALS

SNAP SHOT OF DE DION ENTRY IN MILITARY COMPETITION, TAKEN EN ROUTE

Participation of the War Department in the trials made them more attractive to builders than would have



DELAHAYE ENTRY WITH MOTOR IN FRONT AND HOOD FOR THE DRIVER'S SEAT

been the case had the competition been held for civil honors only, as the Government agreed to pay a bounty to purchasers of such vehicles as it approved for military service. This bounty amounts to a payment of $600 the first year and $200 for the three following years, on condition that the owner of the machine presents it annually for inspection and agrees to turn it over to the military authorities in case of mobilization.

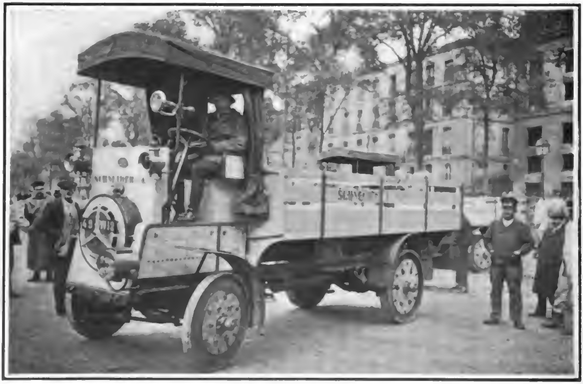
More than fifty entries of vehicles were originally made by intending competitors, although there were a few withdrawals before the actual start. The competing vehicles were divided, broadly, into three classes: Motor trucks and wagons, road trains and omnibuses, and these were again divided into eight sub-divisions, the business wagons being grouped according to their carrying capacities. The classifications and entries were as follows:

Load up to 1200 pounds: Bayard-Clement delivery van. Total, 1.

Load up to 2000 pounds: De Dion, Delaugere-Clayette, and Vinot-Deguingand (2). Total, 4.

Load from 1 to 2 tons: Saurer and Bayard-Clement. Total, 2.

Load from 2 to 3 tons: Lorraine-Dietrich (2), Delahaye (2), Aries (2), Schneider (2), Krieger (2), De Dion (2), Saurer (2), Delaugere-Clayette (2), Vinot-Deguingand (2), Peugeot (2), Panhard (4), Societe Francaise de Constructions Automobiles (2), Berliet (2), Cohendet (2), and Malicet et Blin (2). Total, 32.



SCHNEIDER ENTRY IN 3-TON CLASS, WITH CHARACTERISTIC COIL RADIATOR IN FRONT

ONE OF THE PANHARD ENTRIES (FOUR IN ALL) IN THE 3-TON CLASS

Load exceeding 3 tons: Lorraine-Dietrich (2), Delahaye (2), Aries (2), Krieger, De Dion (2), Delaugere-Clayette, Berna, Berliet (2), and Malicet et Blin. Total, 41.

Road trains: Saurer. Total, 1.

Busses with 6 to 10 seats: Peugeot (2) and Bayard-Clement (2). Total, 4.

Busses with 11 to 20 seats: Saurer. Total, 1.

Vehicles entered in competition for the military awards were required to conform to certain general specifications covering over-all dimensions, axle load, etc., and all-metal or metal-shod wheels were most favorably regarded. Solid rubber tires were permitted, but pneumatics absolutely prohibited. The gas motor vehicles in the military test were also required to be operated with gasoline, or alcohol, or benzol as fuels; the greater part of the running, however, was done on gasoline. Fuel consumption for the various kinds of fuel employed was carefully determined on certain days during the course of the trials. In fairness to the builders, however, the consumption tests were made only toward the end of each period of separate fuel use, so that several days' experience could be had with the use of any one of the fuels and the most satisfactory method of carburation attained before the actual consumption was recorded. For example, the use of alcohol as fuel covered a period of one week, on the last day of which the consumption test

DE DION HEAVY TRUCK WITH PINION AND INTERNAL GEAR REAR WHEEL DRIVE of alcohol was made. A complete record of the total amount of lubricating oil was also kept throughout the trials and this item was incorporated in the efficiency formula adopted. The formula which was used as the basis of awards took account of the fuel consumption per ton-kilometer and the elapsed time. Only such vehicles as made each control on time, throughout the entire trials, were considered in making the awards. The formula adopted is as follows:

$$\frac{T}{P}(C+c+K+p)$$

in which

T=Time of run in minutes.
C=Fuel consumption in francs per kilometer.
c=Total consumption of lubricating oil in francs.
K=Estimated cost of wear and tear of tires and wheels.
P=Useful load carried; body work included.
p=Total weight of vehicle in tons.

Before the actual start of the road trials two days were occupied in an exhibition of the competing machines, at which the government was represented by M. Auar, Minister of Agriculture, whose interest in the trials was on account of the use of alcohol; M. Millerand, Minister of Public Works, and General Brun, Minister of War. During the earlier days of the road trials, which commenced October 18, the daily runs were made in the vicinity of Versailles, starting out from the official garage in the morning and returning to the same place at night. This demonstrated the general all-around "roadability" of the vehicles, as various kinds of road surface had to be traversed and a number of hills negotiated, some with sharp turns at the bottom. During the first week a longer run was made to Clermont-Ferrand, in the interior of France, the trip being made in daily stages of from 60 to 120 miles, according to the class of vehicles. This extended run occupied a week, and upon the return of the competing machines to Versailles the neighborhood trips were resumed until the end of the trials.

ARIES ENTRIES WITH MOTOR UNDER THE SEAT IN 1909 FRENCH TRIALS

FIRST APPEARANCE OF MALICET & BLIN TRUCK

In the original entry list one manufacturer had entered steam machines, but these were withdrawn before the start of the trial owing to a disagreement about the fuel to be used. This left only gas motor vehicles in the trials, although two of these employed electric transmission systems. The entries were made almost entirely by builders whose names have been hitherto connected with the construction of commercial vehicles, with the exception of the house of Malicet & Blin, which has long been identified with the construction of component parts only. These trucks were fitted with a peculiar type of radiator composed of plain copper tube coils with a fan located in the center of the coil. Only one of the heavy trucks entered was provided with a trailer; the Saurer entry in the road train class hauling a trailer, which in general appearance was very similar to a horse-drawn platform truck. Some of the vehicles were fitted with steel-tired wheels. The Krieger entries, for example, having front wheels shod with solid rubber tires and rear wheels with ordinary steel rims. Some difficulty was experienced on cobblestone pavements, during damp weather, with the steel tires, and to prevent skidding leather bandages were fitted. Both motor-in-front and motor-under-the-seat types were represented among the heavy vehicles, and the machines entered in the military competitions were provided with folding hoods to shelter the driver's seat. In general the constructions were on conventional lines, no radical departures from previous models being observed. In the class carrying loads up to 2,000 pounds, all the entries were fitted with closed van bodies and wheels were shod with pneumatic tires. The Delaugere-Clayette and Vinot-Deguingand were equipped with single pneumatic tires in front and twin pneumatics in the rear. Compressed air tanks were carried for the inflation of tires in case changes were necessary on the road. The De Dion entry in this class was equipped with a single cylinder motor. Side chains were employed for the final drive of nearly all the heavy vehicles. The De Dion entries were the exception, being fitted with the dead rear axle and cardan shaft drive, which is a feature of this concern's constructions. Pressed steel frames were used largely to the exclusion of those of the structural steel type which have hitherto been very common.

As we are about to go to press cable advices state that the Saurer machines which are built at Arbon, Switzerland, have won first prize in several of the classes and have been accepted by the military authorities as meeting with their requirements. In a subsequent issue we will give the lists of winners in the various classes, and other interesting technical data.

A Locomobile patrol wagon in Baltimore has covered about 25,000 miles in service and has never been out of commission since it was installed.

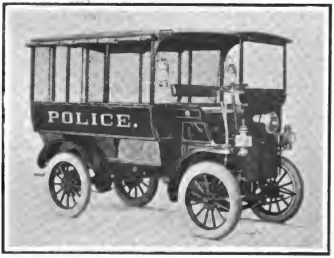
Brittleness in steel does not follow intelligent heat treatment, and the enduring quality is increased in greater ratio than the elastic limit. Consequently crystallization, fatigue or whatever the cause of breakage we are to prevent is called, is less likely in a properly heat-treated and tempered material than in an annealed and soft specimen. This having been discovered in the laboratory and established in actual practice, is now accepted by the metallurgical world, reversing previous general belief.—Henry Souther.

In the injector muffler for gas motors it is the aim to utilize the energy that remains in the exhaust to create a vacuum and aid in the process of cleaning out the exhaust ports of the motor, as well as eliminating noise. Increasing power is one of the advantages sought, and there is no reason why this should be attended by additional noise. The principle involved requires that the flow of gas be directed through a nozzle in such a way that a vacuum will be created in a chamber concentric with and surrounding the muffler chamber proper; the vacuum is due to increasing speed resulting from the use of the nozzle, and the vacuum is filled by gas shunted from the stream that supplies the nozzle, which stream is "baffled" to some extent in its passage. In this way the energy in the gas is expended and the lowering pressure is attended by a reduction in noise; power of the motor increases due to the elimination of back-pressure, and to some extent by virtue of the vacuum.—*The Automobile.*

COMBINATION PATROL AND AMBULANCE

A very useful motor vehicle for municipal purposes is shown in the accompanying reproduction of a photograph of a Franklin wagon in the service of the Washington, D. C., Police Department. It is fitted inside with the usual side seats for prisoners or other occupants, and these seats are hinged so that they will lift up and provide space for a stretcher. The spaces under the seats are accessible through small doors in the rear of the body. Under the driver's seat there is a medicine chest and a small compartment for supplies is located back of the seat, which can be opened from the inside of the body.

The wagon is driven by a Franklin air-cooled gas motor rated at 18 horsepower, fitted with Bosch magneto ignition. The body is of Prussian blue, with red running gear; the panels are of three-ply bent wood. The upper part is entirely encased with wire grill work, and is protected on all sides with curtains. The driver is protected from the weather by a glass front, a mackintosh apron, and side curtains.



FRANKLIN PATROL WAGON FOR WASHINGTON, D. C.

In addition to the ordinary side lamps for night running two brass lanterns are suspended at the sides, back of the driver's seat, so fastened that while they will not rattle in place they can be instantly detached. An 11-inch gong is fitted for warning signals.

The pneumatic tires, 37 by 5 inches in size, are specially large for this comparatively light vehicle, thus insuring durability. Pneumatic tires have been placed on Franklin commercial cars after an experience with both solid and pneumatic tires. In front the vehicle has full-elliptic springs and at the rear semi-elliptic and coil. The weight of the wagon, fully equipped and with gasoline and oil, is 2,980 pounds.

Owners of motor trucks in Ohio are uniting with pleasure car owners in opposing the movement to increase the fees for registering motor cars. Representative Owen J. Evans, of Stark County, announces that he has prepared a bill to be introduced in the next session of the General Assembly which will practically double the fees. Mr. Evans believes that the State automobile department does not produce sufficient revenue and his idea is to increase the fees on all motor vehicles.

ALCOHOL AND GASOLINE CONSIDERED AS FUELS—II*

Effects of Principal Operating Conditions for Internal Combustion Motors--Variations of Load, Mixture and Time of Ignition–Limits of Fuel Consumption Rates Set by Operating Conditions and Engine Design

ROBERT M. STRONG

Effects of Principal Operating Conditions

EFFECT OF DIFFERENT LOADS

THE fuel-consumption ratios given before for alcohol and gasoline (1.45 to 1 and 1 to 1 by volume) are little affected by the load when the other operating conditions are limited to the best for each load. This limitation requires continual change in the time of ignition and in the quantity of fuel supplied, as regulated by the igniter and the fuel needle valve, with a correspondingly wide difference in the numerical values obtained for the minimum fuel-consumption rates for the different loads. Thus the minimum consumption rate of gasoline and alcohol for the maximum load is about 10 per cent greater than that for the best load, which is usually about 80 to 85 per cent of the maximum load; while the minimum fuel-consumption rate for light load, say about one-third load, may be anything greater than that for best load, depending on the disturbing effect of the governor. With the engines used for this investigation, the minimum fuel-consumption rate for one-third load was approximately 50 per cent greater than that for best load.

EFFECT OF MIXTURE QUALITY

For gasoline and alcohol alike, the ratio of air to fuel for the condition of minimum fuel consumption at maximum load was found to be approximately that for a chemical mixture, that is, theoretically just sufficient air for complete combustion in each case. This ratio for gasoline is approximately 15 parts of air to 1 of fuel by weight, and for denatured alcohol (90 per cent ethyl alcohol), approximately 8 parts of air to 1 of fuel. The minimum fuel-consumption rate at best load (about 80 per cent of maximum load) was obtained with a mixture of between 19 and 23 parts of air to 1 of gasoline by weight, and of between 9 1-2 and 11 1-2 parts of air to 1 of alcohol by weight, when used at the same compression pressures; that is, for the most economical use of gasoline and alcohol at the same compression the calculations show that from 25 to 50 per cent excess air was used, depending on the estimated mixture temperature.

From a series of observations of the temperatures of the fuel and air mixtures as they enter the cylinder of the engine, and from measurements of exhaust temperatures for various conditions of operation, a careful estimate was made of the temperature of the ultimate mixture in the cylinder at the beginning of the compression stroke. For the condition of minimum fuel consumption for loads from maximum load to somewhat below best load (about 75 per cent of the maximum load) these estimates show a range of ultimate mixture temperatures from not to exceed about 160 deg. F., if no vaporization of fuel takes place in the cylinder, to not less than 60 deg F., if all the fuel is vaporized in the cylinder.

The average weight of fuel per charge was obtained from the fuel-consumption rate and the average number of fuel admissions per minute, from which the corresponding volume of fuel per stroke was calculated. The volume of fuel and air mixture per stroke was calculated from the piston displacement, multiplied by a factor obtained from the light spring indicator diagram of the suction and compression stroke. These diagrams, if taken carefully, show accurately the volumetric efficiency of the pump action of the engine. Such, in brief, were the data used in determining the air-to-fuel ratios stated above, and a careful study of all the conditions affecting them indicate that the actual values lie about midway between the limits given.

The accuracy of the foregoing method of determining the mixture quality may be questioned, but, be that as it may, for every load there is some best mixture quality and for every mixture quality there is some best time of ignition. But the mixture quality may not be constant for any given load, because there is a disturbing effect if a hit-or-miss governor attachment is used, and the throttling method of governing complicates matters by affecting the compression. From maximum load to about 80 per cent of the maximum, with the best time of ignition, the best mixture is the weakest that will make the engine carry the load. Using such a mixture automatically eliminates the disturbing effect of the governor; or at least the effect is minimized and made constant when the mixture is such that only sufficient governor action is obtained to carry the load satisfactorily under reasonably constant conditions. At about 80 per cent of the maximum load the weakest mixture that will carry the load approaches the limit of dilution with air, beyond which it becomes nonexplosive for the conditions under which it is used in the engine; hence for the light loads the disturbing effect of the governor makes the mixture quality irregular, and may be such that the best results will be obtained with the fuel needle valve much wider open than for the heavier loads.

The extent of the irregularity of the mixing can readily be seen by inspection of series of indicator diagrams taken on the same card. If the hit-or-miss method of governing is used, the irregularities caused by the governor action will be seen clearly in a series of diagrams taken from cut-out to cut-out, or for about the first ten explosions after cut-outs. Such a series also illustrates the fact that when the mixture is irregular the time of ignition, though regulated to give the best ultimate results, is by no means the best for each individual charge of explosive mixture. This may account in part for the fact that the minimum fuel-consumption rate is increased when irregular conditions are caused by the governor action with light loads.

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*Excerpted from report made to U. S. Geological Survey. Continued from page 288, November, 1909, issue.

EFFECT OF TIME OF IGNITION

Ignition at or near dead center will give the best results in some conditions, as for maximunm load, while in others ignition as early as 35 deg. before dead center will be found best. No general rule can be given. The best time of ignition can be judged to a certain extent by inspection of the indicator diagrams, and seems to be relatively earlier for alcohol than for gasoline.

The rate of flame propagation is different for different ratios of air to fuel vapor. A very rich explosive mixture or a very lean one burns slowly as compared with those of intermediate ratio. The rate may depend somewhat on the pressure at the time of ignition and may be different for alcohol and gasoline mixtures. The indications are that the rate of flame propagation for alcohol mixtures is slower than that for gasoline mixtures of the same relative quality compressed to the same pressure, but may be practically the same when the best compression pressure for each fuel is used.

Providing an ignition device such that the time of ignition can be varied from about zero, or dead center, to about 35 deg. advance, is almost as important for obtaining the best results as providing a fuel needle valve so constructed that a wide range of mixture quality can be obtained; for, as previously stated, it is the best mixture quality with the best time of ignition that must be determined for different loads; and this mixture is considerably richer for maximum load than for rated or best load when the governor action is constant.

If the construction of the engine is such that the time of ignition can not readily be varied for each load to suit the best mixture quality, the point to be considered is not that for every mixture quality there is some best time of ignition, but rather that for a given time of ignition there is some best mixture quality. The fixed time of ignition affects the fuel-consumption rate of the engine by limiting the quality of mixture that can be used.

TESTS WITH VARIABLE LOAD

The load, then, may affect the fuel-consumption rate of an engine by limiting the mixture quality that can be used and by determining the irregularity caused by the method of governing. The relation between load, mixture quality, and time of ignition is very complex. The best combination could be determined only by series of systematic tests. Such tests were made to determine the minimum consumption for each engine with each fuel, with each carburetor used, etc., and for each imposed independent condition of operation, such as speed or compression.

Thus, in obtaining the foregoing consumption rates and ratios, fourteen series of tests were made to determine the minimum fuel-consumption rate for each of an average of about five loads, from maximum load to approximately one-third maximum load, on five different engines, with different carburetors, methods of governing, and degrees of compression.

Four of the fourteen series of tests were made with gasoline on three different engines. Two of these were 15-horsepower Otto gasoline engines of identical size, construction, and equipment. The third, a 10-horsepower Nash gasoline engine, was totally different in method of governing and detail of carburetor construction. Two series of tests with gasoline were made on this 10-horsepower engine, but with different carburetors.

Five engines were used for the ten series of alcohol tests, of which two were made on the 15-horsepower Otto gasoline engines and a third on one of these engines after the degree of compression had been raised as much as possible by lengthening the connecting rod. The fourth, fifth, and sixth series of tests were made on a 15-horsepower Otto alcohol engine of identical size with the Otto gasoline engine, but with a different valve arrangement and method of governing. A different degree of compression was obtained for each of these series of tests by lengthening the connecting rod. The seventh and eighth series of tests were made on a 10-horsepower Nash gasoline engine with two different carburetors. The ninth and tenth series of tests were made on a 10-horsepower Nash alcohol engine, which was identical in size, construction and equipment with the 10-horsepower Nash gasoline engine, the only difference being that a higher degree of compression was obtained by diminishing the clearance space in the cylinder head. Different carburetors were used for the two series of tests on this engine.

CHANGE IN IGNITION TIMING

Two series of tests, consisting of nine individual tests with alcohol and nine with gasoline, were made on the 15-horsepower Otto gasoline engine to determine the effect of change in time of ignition on the fuel-consumption rate when the load and fuel needle-valve setting were kept constant. The load and needle-valve setting selected were such that a wide range of ignition timing could be used.

For the gasoline tests the load was 85 per cent of the maximum. The best results, a consumption of 0.66 pound per brake horsepower per hour, were obtained for an ignition timing of 13 deg. before dead center. For an ignition timing of 21 deg. before dead center the fuel-consumption rate was increased 9 per cent, and 36 per cent for an ignition timing of 15 deg. after dead center.

For the alcohol tests the load was 79 per cent of the maximum. The best results, a consumption of 1.1 pounds per brake horsepower per hour, were obtained for an ignition timing of 25 deg. before dead center. For an ignition timing of 30 deg. before dead center the fuel-consumption rate was increased 4 per cent, and 6½ per cent for an ignition timing of 5 deg. after dead center.

The time of ignition was carried to the limit both ways for each fuel, the limit being the earliest or latest ignition with which the engine would carry the load satisfactorily. The disturbing effect of the governor was thus not constant, but it was comparatively slight throughout and the irregularity was probably not appreciable.

VARIABLE FUEL SUPPLY

Four series of tests with gasoline and alcohol were made on the two 15-horsepower Otto gasoline engines. The conditions for two of these series with gasoline and alcohol respectively, were as follows:

For the tests with gasoline a brake load of 85 per cent of the maximum was applied, and the time of ignition selected (21 deg. before dead center) was such that the widest possible range of fuel needle-valve settings for this load could be used. Starting with the minimum opening of the fuel needle-valve and a coresponding rate of fuel consumption of 0.62 pound per brake horsepower per hour, the fuel needle-valve opening was increased until the engine could scarcely carry the load, as indicated by the governor action. This fuel needle-valve setting gave a consumption rate of 1.31 pounds per brake horsepower per hour, or an increase of 110 per cent.

For the tests with alcohol a brake load of 79 per cent of the maximum was applied and the time of ignition selected (17 deg. before dead center) was such that the widest possible range of fuel needle-valve settings for this load could be used. Starting with the minimum opening of the fuel needle-valve and a corresponding rate of fuel consumption of 1.1 pounds per brake horsepower per hour, the fuel needle-valve opening was increased until the maximum opening was reached. This fuel needle-valve setting gave a consumption rate of 1.6 pounds per brake horsepower per hour, or an increase of 45 per cent.

When the results of these tests were platted, showing the relation between the brake horsepower and the rate of fuel-consumption, the results obtained for six intermediate fuel nedle-valve settings were found to lie on a straight line between the values given above in each case. As the load was kept constant the disturbing effect of the governor was not eliminated, but probably was slight, as shown by the indicator diagrams.

The other two series of tests were made in a similar way, but with a light load, so that the disturbing effect of the governor was relatively great. In these tests, eleven each for gasoline and alcohol, the needle-valve settings were not carried to the limit either way, but only so far as was necessary to show that for light loads the minimum fuel-consumption rate is not obtained with the smallest possible fuel needle-valve setting, the best setting being rather that which gave the most nearly uniform mixtures, as shown by the regularity of the shape of the successive indicator diagrams. This was also found to be true when the best ultimate settings were determined for the light loads.

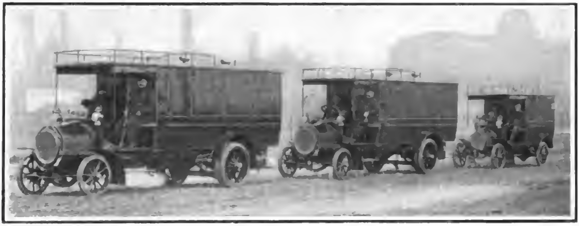
INCIDENTAL MATERIAL

In all, 1,300 tests, including trial tests, were made to determine the foregoing deductions and figures. The detailed results of these tests afford an opportunity to study the effect of degree of compression, mixture quality, and time of ignition on the fuel-consumption rate, and include a great deal of incidental material, such as indicator cards, maxmum-pressure measurements, temperature records for fuel and air mixtures entering the cylinder, and the like. The fuel-consumption rates are given in pounds, gallons, and British thermal units per brake and indicated horsepower per hour. Mechanical efficiency, indicated thermal efficiency, and thermal efficiency of the brake are also given. But these tables are too bulky and involved to present at this time. The trial tests have been prepared in condensed form for the final report, and thus present some interesting and important information, showing what difficulty was experienced in determining the best ultimate results in some cases.

(To be continued.)

PRISON MOTOR VANS FOR RUSSIA

The group of sombre looking motor wagons shown herewith depicts three machines recently sold to the Russian police authorities at Moscow by the Neue Automobil Gesellschaft, of Ober-Schoneweide, near Berlin. The two large vehicles are for the conveyance of prisoners, and are built on the "L4 type" of N. A. G. chassis which is fitted wtih a four-cylinder vertical motor of 104 mm. bore and a 130 mm. stroke, and rated at 18-2 horsepower when running at a speed of about 900 revolutions per minute. Other well-known N. A. G. features may be recognized in the circular radiator, the cast-steel wheels, etc. The bodies accommodate about twenty men, and carry an armed official before and behind. They are without windows, the ventilators and lamp tops being discernable on the roofs.



PRISON MOTOR VANS BUILT IN GERMANY FOR SERVICE IN RUSSIA

The small vehicle in the rear of the group is for the express "delivery" of what was curiously described in Berlin as "a few select prisoners," meaning prisoners who were too dangerous to be carried in the usual company. The machine is reported to be otherwise engaged in the conveyance of officials from one station to another and on other such like duties. Its body is carried on the N. A. G. type A. C. 2, fitted with a two-cylinder 12-horsepower motor, which develops its power at 1,100 revolutions per minute in cylinders of 104 by 110 mm.

The Neue Automobile Gesellschaft has recently effected numerous sales in Russia, including 'buses to Moscow and trucks to Odessa.

RECORD OF COAL DELIVERY BY TEN-TON TRUCK

SOME very interesting data have been kept of the operation of a 10-ton Hewett truck in the service of Burns Bros., one of the largest retail coal concerns of New York City, and are presented herewith by courtesy of the Hewitt Motor Company. The data speak for themselves and appear to indicate, what would naturally be expected, that where it is practicable to put the large unit into service it proves more economical in operation per ton-mile than trucks of smaller capacity.

On the record for half a month it is evident that this truck is able to deliver 4,000,000 pounds of coal per month in the territory embraced between Eighteenth and Eighty-first streets and the Hudson River and Sixth Avenue, New York. At the end of four months' operation the truck does not show any abnormal wear, according to the statement of Mr. Hewitt, and during that period there have been no breakage and no serious deterioration of parts. The cost per ton for delivery is asserted to be only half that of delivery with horses.

It is important to note that the tremendous amount of work performed by this truck—more than 350 ton-miles per day—is in a considerable measure made possible by the enterprise of Bruns Bros. in putting in a special chute at their coal yard by which the truck can be loaded with ten tons of coal in a minute and a half. Attention was called to the economical necessity of adopting such quick-loading facilities in connection with large-capacity motor trucks in an editorial in the September issue of THE COMMERCIAL VEHICLE, and the results obtained in this case seem to bear out the contention there made.

Mr. Brook, of Burns Bros., when seen at the office of the company in the Hudson Terminal Building, was loath to go into particulars regarding the service of the truck, on the ground that it would take too long to get the details from the mass of records kept and that the company was too busy. He stated, however, that the truck was engaged in hauling all sizes of anthracite from the pockets at Thirty-eighth street and Eleventh avenue (North River) to hotels, office buildings, private houses—in fact, any customers—within a distance of two miles or thereabouts. It was impossible, he said, to give any figures as to average length of a trip owing to varying conditions in unloading; the first load might be discharged at a given destination in two or three minutes and the next load might require half an hour, because the coal space and receiving hole would be obstructed by the first load. The truck discharges its load from the side at the base of the steel body and can chute the coal automatically to a distance of 6 feet.

In this connection it should be mentioned that the police regulations with regard to street traffic in New York City forbid trucks backing up to curbs on the principal streets to discharge or receive loads. They must pull up alongside so that they will not obstruct traffic so much. Practically all large hotels and office buildings, apartment houses and a good many private residences have their coal bins under or directly adjacent to the sidewalks with the receiving holes cut through the walks within a few feet of the curb. For these reasons the side chutes are required on large coal trucks serving such places. The practical impossibility of using a truck of from 7 to 10-tons capacity with an elevating and tilting body to discharge its load of coal through a long, rear-end chute across a sidewalk into a basement window is evident.

Burns Bros. have been experimenting with the use of motor trucks in coal delivery for several years. That they have at last become satisfied of the superiority and greater economy of the motor truck over horse-drawn trucks in this service is sufficiently indicated by the statements made by Mr. Brook that the company has ordered seven Manhattan 7-ton trucks and a 10-ton Couple-Gear truck in addition to the Hewitt 10-ton truck it is now using. The company is now awaiting delivery of these machines. The Couple-Gear truck is to be used with a

HEWITT 10-TON TRUCK STARTING OUT WITH LOAD FROM BURNS BROS.' COAL YARD two-wheeled trailer, a special design having been made for the order. The capacity of the truck and trailer together will be 10 tons. Some of the Manhattan trucks will have side discharge chutes and others will empty their loads from the rear.

The Hewitt 10-ton truck which made the half-month's record here given is believed to be the largest motor truck in successful operation in the country. In working out the problem of this large machine the question of tire equipment presented many difficulties. Block tires were thoroughly tried out and found to work satisfactorily and so Kelly-Springfield sectional tires were adopted. Despite the great combined weight of the machine and its load—more than 33,000 pounds—the wheels have been calculated so that the weight on the tires will not exceed 700 pounds per inch of width. The front wheels are equipped with 5-inch dual sectional block tires 36 inches in diameter, giving a 10-inch contact line, and the rear wheels with 7-inch tires of the same kind 44 inches in diameter, giving a 14-inch contact line. Thus the weight per inch of tire width is much less than with horse-drawn trucks, where loads commonly exceed a ton per inch of width.

TRUCK OWNED BY BURNS BROS.

FOURTH MONTH OF OPERATION.

Tires in excellent condition; will certainly go eight months, and probably more.

No delays, no loads missed in four months.

Car in excellent condition.

BASE—38th St. and North River.

LOADS—Average weight, 20,250 lbs.

Date. Loads.	Gas, Gals.	Address.	Day's Mileage	Total Distance.
Oct. 13—1	12	81st St. & Columbus Ave...	37.0	5.5
" —2	..	80th St. & West End Ave...	..	10.0
" —1	..	23d St. & 6th Ave..........	..	3.5
" —4	..	18th St. & 6th Ave..........	..	18.0
Oct. 14—1	8	81st St. & West End Ave...	37.0	5.5
" —7	..	10th St. & 6th Ave..........	..	31.5
Oct. 15—1	10	81st St. & West End Ave...	38.0	5.5
" —1	..	81st St. & Columbus Ave...	..	5.5
" —6	..	18th St. & 6th Ave..........	..	27.0
Oct. 16—5	12	18th St. & 6th Ave..........	34.0	22.5
" —1	..	81st St. & Columbus Ave...	..	5.5
" —1	..	44th St. & 6th Ave..........	..	3.0
" —1	..	44th St. & 6th Ave..........	..	3.0
Oct. 18—1	12	81st St. & West End Ave...	36.5	5.5
" —1	..	73d St. & West End Ave...	..	4.0
" —6	..	18th St. & 6th Ave..........	..	27.0
Oct. 19—2	15	56th St. & 7th Ave..........	36.5	7.0
" —3	..	18th St. & 6th Ave..........	..	13.5
" —4	..	22d St. & 6th Ave..........	..	16.0
Oct. 20—1	11	81st St. & West End Ave...	33.5	5.5
" —3	..	57th St. & 7th Ave..........	..	10.5
" —1	..	22d St. & 6th Ave..........	..	4.0
" —3	..	18th St. & 6th Ave..........	..	13.5
Oct. 21—8	10	57th St. & 6th Ave..........	34.6	32.0
" —1	..	43d St. & 6th Ave..........	..	2.6
Oct. 22—9	12	57th St. & 6th Ave..........	40.0	40.0
Oct. 23—8	17	57th St. & 7th Ave..........	33.5	28.0
" —1	..	81st St. & West End Ave...	..	5.5
Oct. 25—1	10	81st St. & West End Ave....	37.0	5.5
" —7	..	18th St. & 6th Ave..........	..	31.5
Oct. 26—3	14	18th St. & 6th Ave..........	37.8	13.5
" —3	..	71st St. & Central Park W..	..	13.8
" —1	..	81st St. & Columbus Ave....	..	5.5
" —1	..	79th St. & Amsterdam Ave..	..	5.0
Oct. 27—1	12	79th St. & Amsterdam Ave..	34.3	5.0
" —1	..	43d St. & 8th Ave..........	..	2.0
" —3	..	71st St. & 8th Ave..........	..	13.8
" —3	..	18th St. & 6th Ave..........	..	13.5

Average miles per day	35.4
" gallons gasoline per day	11.9
" miles per gallon	2.97
" number of loads per day	8.3
" tons per day	84.03
Total tons in 13 days	1,092.39
" pounds in 13 days	2,184,640
Cost per day (maximum)	$16.00
" " ton	$.19
Average miles from base	2.13
Weight of car, empty, lbs	13,000
Average weight of load, lbs	20,250
Total weight, lbs	33,250
Average rolling load, lbs	23,125
" ton-miles per gallon of gasoline	34.43

Running gear and frame have been especially constructed to carry the great weight, and the speed has been reduced to from 6 to 7 miles an hour, which is as high as it is safe to operate such a ponderous mass. Special roller bearings are fitted on the rear axle. The engine, however, is the same as that used in the company's 5-ton trucks, which is geared for a normal speed of 8½ miles an hour. It is a water-cooled, four-cylinder, vertical engine of 4¼-inch bore and 5½-inch stroke, giving 28 horsepower by the A. L. A. M. rating, but developing 36-brake horsepower, at 1,000 revolutions per minute, according to maker's tests.

When so ordered, both the 5-ton and 10-ton trucks will be furnished to run on alcohol, which the makers estimate will cost about $1.25 a day more than gasoline for operation. By using alcohol, however, the users of the truck can evade the restrictions against admitting motor vehicles using gasoline to the docks in New York City.

The transmission system of this huge machine includes a planetary gearset, giving two speeds forward and reverse, and final drive by double side chains.

General dimensions of the vehicle are as follows: Wheel base, 11 ft. 6 in.; tread or gauge, 5 ft. 8 in.; height of platform or bed from ground, 45 in.; length of body back of driver's seat, 14 ft.; maximum width, except over rear wheels, 6 ft. 8 in.; depth of pressed steel frame, 9 in.

RECORD OF MOTOR CHEMICAL ENGINE

Springfield, Mass., uses motor apparatus almost exclusively in its fire department, and the department is so well satisfied with the results obtained that it has recently placed additional orders for more pieces of apparatus.

The fire chief has been using a motor car for two years in his work and, according to his own statement, has never been delayed longer than 20 seconds. Speaking of the motor trucks in the fire service, he said the men never thought of them giving trouble on their way to or from a fire.

Six months' service of the latest combination chemical and hose truck added to the department's equipment was as follows:

Number of alarms responded to, 71.
Number of miles traveled to fires, 681.
Chemical tanks used at 43 fires.
Small extinguishers used 4 times.
Used 35-gallon tank 27 times.
Used water line 12 times.

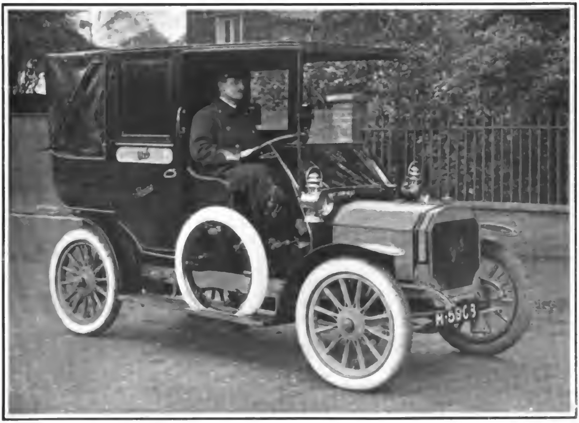
There are fourteen factories in Detroit devoted exclusively to the manufacture of motor vehicles, employing a total of 14,670 men, with an annual payroll of $9,882,000. The companies operating these factories are capitalized for $6,250,000 and the value of the output this season is estimated at $54,325,000.

PANHARD TAXICAB BUILT IN PARIS, FRANCE

WHEN a motor vehicle builder who has acquired a reputation for reliability and durability of the factory product puts out a new machine as a solution of a difficult commercial vehicle problem that machine is certainly an object of special interest to the trade. This is the case with the new Panhard taxicab which is being marketed by that well-known Paris concern. Five hundred of the cabs have been ordered by the British agents of the builders—W. & G. du Cros, Ltd.

The accompanying illustrations show the complete vehicle and the exhaust side of the gas motor in the chassis. In designing this cab special attention has been given to the strength of the frame, gears, front and back axles, and propeller shaft joints. The frame is narrowed to a considerable extent in front, so that sufficient lock is obtained in order to turn the vehicle in a 25-foot circle.

Coming to details, the first thing which demands attention is the particularly neat-looking motor. The motor is of exceedingly simple construction. The four cylinders are cast *en bloc*, a larger space being left between the second and third cylinder barrel than between the others, so that a center bearing can be given to the crankshaft. A good point in the construction of these cylinders is that as the exhaust gases come from the ports they pass into a receiver cast wtih the cylinders, and water-jacketed in the same manner as the combustion chamber. This prevents unequal expansion at this part, a trouble which most makers of block cylinders have experienced, and in some cases very seriously. The valves are all arranged on the left-hand side of the engine, and are exceedingly quiet in action. The bore of the cylinders is 80 mm. and the stroke is 120 mm.



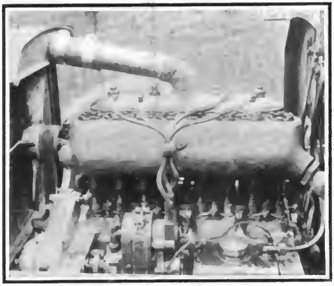
TAXICAB BUILT BY THE OLD-ESTABLISHED HOUSE OF PANHARD & LEVASSOR, IN FRANCE

Water cooling is on the thermo-syphon principle, with exceedingly large inflow and outflow pipes connecting the radiator wtih the cylinder jackets. The radiator has eighteen vertical rows of flattened tube, the tubes being connected together by fins, which serve to stay the tubes, and also radiate heat from the jacket water. The fan pulley face is covered with leather.

The carbureter is on the well-known Krebs lines, slightly modified in this model for ready control by the driver. The throttle of the carbureter is controlled in three ways. For ordinary driving, a pedal is operated by the right foot of the driver, this acting upon the throttle through the medium of suitable connections. A governor arranged at the forward end of the camshaft can also act upon the throttle to prevent racing of the engine, whilst the throttle can be set to any opening by means of a thumb-operated lever mounted on the dash.

The Nilmelior high-tension magneto is the only ignition mechanism fitted, the time of ignition being fixed. Thus the control of the engine is exceedingly simple and the steering wheel is free from all levers. The dash is not over-ornamented, only the body and sights of the lubricator, the before-mentioned engine control lever, and a grounding switch for the magneto being fitted thereto.

The lubrication system is mechanical, a special type of pump operated from a worm on the rear end of the camshaft being used in conjunction with the sights of the dash to furnish the requisite amount of oil to all the working parts of the engine and to the gear box. The oil supply is taken from a tank mounted on the left-hand side of the engine between the two supporting arms on that side and fitted with a large filling cap.


MOTOR COMPARTMENT OF PANHARD TAXICAB

A rather neat and substantial form of cone clutch is fitted inside the flywheel, the male portion being pressed inwards to release the drive from the gear box shaft.

The gear box gives three speeds, with the direct drive on the third, the gears being operated by a lever working over a sector. There is a swivel-jointed pressed steel torque rod connecting the rear axle and a cross member of the frame, this piece of pressed work being very finely carried out.

The working brake is arranged so that the pedal connections operate on the rear end of the gear box shaft. It is of the metal-to-metal contracting type, cam-actuated. The rear wheel brakes are internal expanding, and are carefully balanced. The brake connections to the rear wheel are simply a piece of thin steel like a stout tape measure and cannot rattle.

The wheelbase is 8 feet 4 inches, the tread 4 feet 10 inches, and the wheels have 815 by 105 mm. Dunlop tires. The frame is carried on semi-elliptic springs at the front and (almost) three-quarter elliptic at the rear. The front axle is of I section, the steering rod being in front of the axle. The main steering lever is attached to the quadrant shaft inside the frame to the left hand of the box, and not outside, as is the more usual practice, and therefore the main steering rod cannot be fouled by the front wheels when they are at their greatest lock.

The complete vehicle, as here illustrated, is finished in green and primrose colors, and with its brass mountings presents altogether an attractive appearance. The driver is extremely well protected.

BREWERY ABANDONS HORSES FOR MOTOR VEHICLES

IT is not an uncommon experience in the marketing of commercial vehicles to learn of the conversion of a concern from an attitude of complete indifference to a most enthusiastic advocacy of the motor vehicle. This is probably the natural result of the trial of a commercial vehicle, in a suitable service, in which those charged with its operation and maintenance are willing to accept competent advice. A case in point is the recent action of the American Brewing Company, of Philadelphia, in dispensing entirely with horses and installing a complete delivery system of electric trucks. In the latter part of 1908 this brewery purchased a 3 1-2 ton 4-motor 4-wheel-drive electric truck from the Commercial Truck Company of America, which also is located in Philadelphia. At the beginning of the present year the brewery was so well satisfied with the performance of the first machine that it ordered two more, one 5-ton and one 2-ton electric truck of the same make.

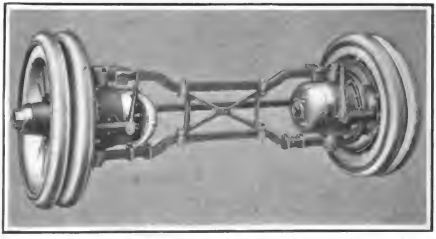


FIG. 1—REAR AXLE ASSEMBLY OF COMMERCIAL TRUCK CO. OF AMERICA

Subsequently another order for trucks was placed with the makers, and last month the brewery management decided to purchase four more trucks from the Commercial Truck Company of America and substitute an all-motor-wagon delivery for the mixed horse-drawn and motor-driven system which it had been operating for some months. The abandonment of horses was incidentally the means of giving the brewery a large amount of additional floor space for the needed extension of its plant, the horse stables being available for this purpose. The electric trucks are garaged in the loading shed of the brewery and consequently do not occupy any space needed for other purposes during their period of inaction every day. The value of the floor space made available by reason of the change from horses to machines is greater than the total cost of the motor vehicle equipment.

The latest vehicles brought out by the Commercial

Truck Company of America, Philadelphia, are of 3½ and 5 tons capacity. They are electrically driven and all four wheels are fitted each with a compact General Electric standard motor. The connection between the two wheels of a same pair are rigid; it will be remembered that a limited amount of play was allowed in this joint in the former designs with a spring interposed for shock absorbing purposes.

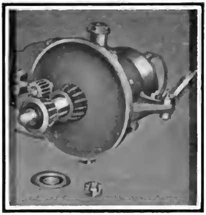


FIG. 2—MOTOR AND CASING

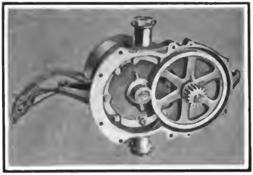


FIG. 3—CASING WITH SPINDLE REMOVED

This new electric drive being the most conspicuous point in the construction of these machines, it is shown in detail in the accompanying illustrations.

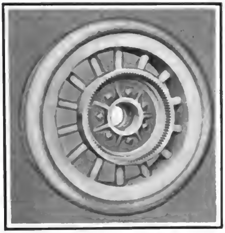


FIG. 4—WHEEL AND INTERNAL GEAR

In Fig. 1 is given a general view of the rear axle. The axles are steel forgings, made in two like parts and separated by an X-shaped spacer. Bosses are formed on the ends of the forgings which are bored out and bushed to receive the trunnions which are a part of the motor casings. Front and rear axles are identical and the motors are mounted similarly. At the rear axle a steel bar in front of the axle is bolted to each motor to hold it in line. At the front axle the motors are held in line by the steering mechanism. Fig. 1 also shows the spring seat at each end of the top member and the brake mechanism consisting of contracting bands on all four wheels. The brush rigging and the commutators are enclosed in the hemispherical casing at the internal end of the motor and are easily accessible.

Fig. 2 shows a motor and its casing ready to assemble in the axle. The pinion which projects through the case meshes with an internal gear bolted to the wheel. The outwardly projecting flange is provided as a protecting dust and mud guard and forms a grease tight joint with the drum on the wheel.

Fig. 3 shows the motor casing with the spindle removed and illustrates the first gear reduction. The forged steel motor pinions mesh with the large cast steel gear on which are directly mounted bronze pinions previously mentioned as meshing with the internal gear in the wheel. It will be seen that the spindle casting when bolted in place forms an oil tight compartment for the first gear reduction. This insures better efficiency and longer life.

Fig. 4 shows one of the road wheels with twin rubber tires. The hub and flange are steel castings and the internal gear is a steel forging, secured to the hub by stout bolts. The hub cap has a taper thread which effectually prevents it from jarring loose.

Underneath the steering wheel, which is in the common location on a vertical pillar, there is fitted a supplementary wheel which takes the place of the usual single lever operating the controller. The latter is of the continuous torque type, giving a uniform acceleration from the first to the last speed without opening the circuit or letting up the pull between the points.

COLUMBUS, O., BUYING MOTOR WAGONS

Within the past month the popularity of motor trucks for heavy work and of delivery wagons for lighter work has become quite apparent in Columbus, Ohio. It has been only a few years since the first truck was placed in operation on the streets of the Buckeye Capital, and it has only been a few months since the possibilities have been realized to a certain extent.

Within the past few days the Ohio Automobile department has registered quite a number of motor trucks to be used in Franklin county. Among the concerns using them are the Scioto Valley Supply Company, two large trucks; the Kauffman-Lattimer Company, several heavy trucks; the Gwinn Milling Company, five two-ton trucks and several trailers that can be attached to them; the Kilbourne & Jacobs Manufacturing Company, and a considerable number of others.

Department stores recently have taken up the idea of using light delivery wagons equipped with motors instead of the old-fashioned horse-drawn vehicles. Among the stores adopting motor delivery wagons are The Home Store and Dunn-Taft & Co.

The Columbus *Citizen*, a daily newspaper; several of the local laundries, dye houses and other concerns of that character have also adopted motor delivery wagons.

The Commercial Vehicle

Vol. IV December 1909 No. 12

Published Monthly by The Commercial Vehicle, Incorporated, at
1402 Broadway, New York City

Cable Address
Comveh, New York

Long Distance Telephone
425 38th Street, New York

H. F. Donaldson, President and Editor
H. W. Perry, Associate

Advertising Department
Warner S. Young

Subscription Rates

United States, Canada and Mexico . . . . One Year $2.00
Other Countries in Postal Union . . . One Year $3.00

Notice to Advertisers

Changes in copy or in orders for advertisements for the month following must reach us not later than the 15th of the current month when proof is to be submitted, and not later than the 20th when no proof is required.

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Entered as second-class matter, September 13, 1906, at the post office, New York, N. Y., under the Act of Congress of March 3, 1879.

OPENING OF THE SHOW SEASON

On the last day of this month the American Motor Car Manufacturers' Association will open the doors of its annual show in the Grand Central Palace, in New York, and they will remain open until January 7, 1910. This will practically begin the show season in the United States, so far as the builders of commercial vehicles are concerned. A number of the latter have secured space at the Palace show, and will there display their latest designs for public inspection. The development of the pleasure car industry has been so great during the past year that the demands for space made by the automobile builders far exceed the capacity of the hall, even though additional floor area has been apportioned for their display. This will naturally have the effect of making the commercial vehicle section seem smaller than heretofore by comparison. The same conditions confront the management of the Association of Licensed Automobile Manufacturers, which opens its annual exhibition of motor vehicles in Madison Square Garden, New York, on January 8 and closes January 15.

Profiting by long experience in show management, the officials of both exhibitions have perfected plans for very artistic efforts in arrangements and decorations which will assist in drawing the crowds of sightseers who enjoy a spectacle, even if their direct interest in the wares on view may be slight. At the Palace show a commendable effort will be made to secure a large attendance of carriage dealers from all parts of the country, for it is argued that the dealer in horsed vehicles is well equipped by his acquaintance, and by his knowledge of vehicle buyers' requirements to take up the sale of motor vehicles successfully.

There is no doubt that among the tens of thousands of visitors of all classes who will attend the shows a considerable percentage will be directly interested in the commercial vehicle; and yet the comparison is inevitable between this percentage and the majority who would attend an exhibition devoted exclusively to motor vehicles for industrial purposes. It is not to be denied that there is an indirect or educational value in the opportunity to bring work vehicles to the notice of practically every adult who may attend the pleasure shows, but just how the salesman may distinguish between the visitor at his stand who requires only a "missionary" effort and a prospective purchaser, is a difficult one to answer. The most likely looking visitor may be the least likely buyer, and vice versa.

Probably it is a case of natural evolution, and the work vehicle adjunct to a pleasure car show may be the inevitable beginning of a progressive movement that will find its full development in a comprehensive display of business vehicles for business men, at which the sightseer will be in the minority.

Following the New York shows there will be the succession of exhibitions in other cities, including the great displays in Chicago, opening February 5, and in Boston, opening March 5 next.

* * *

MOTOR DELIVERY FOR NEWSPAPERS

One day with another—cloud or shine or rain or snow—there is no one field of the commercial vehicle more open and inviting than is that of the city newspaper delivery. In those larger cities of the country where there is such keen rivalry in the newspaper field, time is the all-important element in the making of the newspaper and getting it into the hands of its readers. And the readers of those morning and afternoon newspapers of metropolitan circulation are widely scattered.

Every man who has worked in the editorial or mechanical departments of a great newspaper knows the significance of the newspaper "dead line." The newspaper dead line is drawn in half a dozen departments of the sheet. There is a minute in the clock after which no other one line of copy can be set by the compositor; another line is set at which the newspaper forms must be made up; still another line is that at which the last matrix must go to the stereotypers; then from the autoplate stereotyping machines to the press; from the press to the paper delivery wagon, and to the time the wagon MUST start on the run for the point of delivery—agency, railroad train, steamer or trolley line—a minute of sixty seconds may be the all-important thing to an important section of a paper territory. And the condition may hold 365 days a year without letting up a second.

Much has been said from time to time in favor of the horse as against the commercial vehicle, on the ground that city pavements are bad. But in the case of the newspaper, almost universally there is no such complaint favoring the horse. The newspaper office is in the central portion of the city. The great lines of transportation center as closely there as is possible. No other vehicle in a city is allowed more leeway as to excess speed than is the newspaper delivery wagon. The police patrol and the fire engine, only, may take wider liberty with a speed ordinance.

But with an assured good pavement to established depots of delivery and this leeway accorded the newspaper delivery wagon, is not the horse an almost antiquated thing in comparison with the commercial wagon?

The Mergenthaler type-setting machine sets type with a swiftness never dreamed of twenty years ago. The wonderful auto-plate turns out the news page castings almost as fast as they can be counted. The octuple perfecting press folds and counts the newspaper far faster than they can be counted by the human eye. But when the paper is complete, the old, smooth-shod, easily winded horse, which is as slow as ever he was, must "get there" with the papers.

Is the situation not just a little bit anomalous and absurd?

In a certain western city a newspaper adopted the motor delivery wagon. The delivery was so much quicker than its competing horse wagons that the paper lengthened its "dead line" everywhere, shoved up the clock limit, printed the latest possible scrap and line of news, and by overdoing an already good enough thing, worked such hardships upon its vehicles as to run the motor wagons off their legs—to set a mark against them, simply because they could not prove a perpetual property in perpetuity, actuated by the principle of perpetual motion.

In many circumstances—simply under the impression that the commercial vehicle, being inanimate and without sense of fatigue or suffering—other users of the wagon have criticized their ultimate destructibleness. They forget that in the locomotive and in the passenger and freight car, *mileage* is the measure of their life. And the faster they are run and the less attention to wear and tear given them, the shorter this term of life is.

But this is nothing against the commercial vehicle. There are newspaper delivery runs which on a hot day may kill a horse in his harness. With the afternoon papers, having two or three or four editions, STATION DELIVERIES MUST BE MADE ON TIME! Speed of the wagon may mean more than the speed of every department of the newspaper, with its half-dozen "dead lines" which must not be overstepped. "Get there with the papers" is the all-important slogan of editor and publisher, and NOT to get there may be serious in even ONE single instance.

"How late can we hold the forms open and yet catch the train?"

This is one of the most important questions in the making of a successful daily newspaper of the present day.

Shall the publisher continue much longer to answer the question with a horse?

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PARADE OF COMMERCIAL VEHICLES

Parades of work horses and vehicles are a familiar annual fixture here and abroad, and now London has recently displayed its progress in street transportation by a parade of commercial vehicles. This was not "spontaneous," of course, but was organized by the Commercial Motor Users' Association and carried out in a very creditable manner for a first attempt. There were about forty machines in line, covering a very wide variety of types and uses. In England, where steam has had a great following among business vehicle users, it was to be expected that this motive power would be well represented, and a considerable number of steamers held place in the line. In fact, one of the Thornycroft steamers, or rather its driver, was awarded a prize for "exceptional mechanical ability." The machine was put in operation originally in 1901 and had covered 50,000 miles in actual service, of which 20,870 were made without an involuntary road stop. This was by no means the highest mileage record of a machine in the parade, one steamer having 85,000 miles to its credit, and several other vehicles, both steam and gas motor, exceeding the 50,000 mark.

The purpose of this parade was really to encourage the drivers to take care of their machines rather than to make a public display of the machines themselves, as all the prizes awarded were to drivers, according to the records they had made in their employers' service. Many of the records were really remarkable, considering the comparative newness of this method of transportation and the inexperience of operatives. Driver A. Hurst's record showed 16,000 miles without a single one lost, and Driver A. Foster had a loss of only 1.3 per cent in 16,000 miles.

If such a demonstration served no other purpose than to call public attention to the reliability of motor vehicles and the results that skilful driving can accomplish, it would be well worth the time and comparatively small amount of money expended by the promotors. A parade in New York, with its attendant publicity, would be a great help to the motor vehicle salesman who, in the last analysis, furnishes the wherewithal to develop the industry.

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EFFECTS OF TRAFFIC ON ROADS

The charge that motor vehicles "tear up the roads" is one that is often loosely made by persons whose observation has never extended further than to gaze at the cloud of dust raised by a fast-moving motor car on a dry day. Carefully conducted experiments made at various times, here and abroad, do not bear out this accusation, and those recently conducted in New Jersey by the engineer of Sussex County confirm the more enlightened view. On a selected stretch of telford road, motor cars were driven at various speeds from ten to sixty miles an hour, the weight of each machine being about one ton. At speeds of less than twenty miles an hour the amount of dust raised was negligible and the vehicles appeared to have really compressed the surface material, and at high speeds the only effect was to strip the road surface rather than to "tear it up." Subsequent trials with heavy horse-drawn vehicles demonstrated that the horses' shoes and iron-tired wheels had a marked disintegrating effect. As practical commercial motor vehicle speeds are below and not above twenty miles an hour, it is altogether likely that continual traffic of this sort would have a very much less destructive effect upon roads surfaces than horsed vehicles or even pleasure cars. In fact, with the present tendency toward the use of large tire sizes, the rolling effect of heavily laden trucks might reasonably be expected to have a preservative influence. Of course, where roads are badly made and not kept in repair, especially where the surface drainage is neglected, wheeled traffic of any sort is bound to make bad conditions worse. The tests here discussed were carried out on a stretch of road which was in the ordinary condition of repair and also on prepared surfaces.

SIZES OF WHEELS FOR MOTOR VEHICLES*

A Plea for an Increase in the Size of Road Wheels for Motor Trucks and Omnibuses with a View Especially to Minimizing Vibration

IN comparing the general design of motor vehicles of all kinds with that of other wheeled conveyances one of the most striking points is the very small size of the wheels employed, in proportion to the weight carried. A bicycle, it is true, has wheels only 28 inches in diameter, but the weight carried on these is usually only about a hundredweight per wheel or less. Ordinary light two-wheeled dogcarts, etc., however, have wheels from 3 feet to 5 feet in diameter, even when the weight on them is only about 300 pounds per wheel, while for heavier weights than this wheels under 4 feet are comparatively rare. Traction engines have wheels up to 7 feet 6 inches in diameter. On the other hand, motor-cars carrying several hundredweights per wheel often have wheels very little, if at all, larger in diameter than a bicycle, and motor-wagons have wheels about half the diameter which would be considered necessary to carry the same weight at the same speed in horse-drawn vehicles. Nothing is, in fact, so striking in the comparison of a horse-drawn and motor-omnibus as the fact that although the latter weighs about twice as much as the former, the newer type of vehicle has wheels little more than half the size of those of the older form of conveyance. It is therefore interesting to examine the considerations which determine the size of wheels used in various vehicles, and the effect the size of the wheels has on their efficiency.

SMALL WHEELS HAVE ADVANTAGES

There can be no doubt whatever that, from both the designer's and constructor's point of view, the small wheels present several advantages. They are lighter, cheaper, and put less strain on the axles. In many cases it is a matter of greater simplicity to place the platform of the vehicle at the height required if the wheels are small, and it is always easier to arrange for the necessary lock for the steering-wheels. It may therefore be taken for granted that makers of horse-drawn vehicles and traction engines would not have made their wheels of the present size if it were not necessary to do so. In the case of traction engines one of the principal developments in design has been the increase in the size of the wheels, and it is quite clear that the expense of this would not have been undertaken without cause.

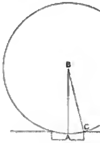

FIG. 1

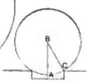

FIG. 2

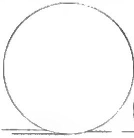

FIG. 3

FIG. 4

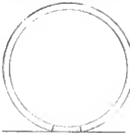

FIG. 5

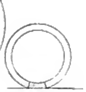

FIG. 6

In practice the principal points which limit the extent to which the size of wheels can be reduced for a given load are the vibration caused by the small wheels moving over the inequalities of the road, and the destruction of the road surface from too great a concentration of load. Both these depend to a large extent on the road surface, and the size of wheel necessary depends, therefore, primarily on the latter.

If we take the theoretical proposition of a wheel which is a perfect cylinder moving on a road which is a perfect plane, the contact is necessarily a mathematical line whatever the diameter of the wheel. At the same time the crushing stress at the point of contact is infinite, and therefore these conditions can never exist in practice, as the wheel, or road, or both, become deformed until the area of contact is large enough to sustain the load. It is also impossible to make a road which is mathematically a plane surface. The conditions are most nearly fulfilled on a railway or tramway in which both the wheels and road are of steel, and therefore approach very nearly to the cylinder and the plane, while the deformation necessary to carry the load is very small. Accordingly, very small wheels are used on a railway, in spite of the fact that the weights carried are large and the speed very high. Thus the bogie wheels of an express locomotive are often only 3 feet in diameter, though they carry 5 tons or more per wheel, and the speeds are over 60 miles an hour.

CASE OF THE ORDINARY ROAD

In the case of an ordinary road, however, we are dealing with a surface very inferior to the perfect plane. In considering the question of vibration we may assume for the time that the surface will carry the load without material deformation, and that iron tires are used. A little consideration will show that the vibration must necessarily increase very rapidly as the size of the wheel is reduced. Figs. 1 and 2 show the effect of two wheels passing over the same sized hole in a hard road, one wheel being half the diameter of the other. The small wheel will go deeper into the hole, the exact amount depending on the proportion of the width of the hole to the diameter of the wheel, but always increasing in a greater ratio than the inverse of the diameter of the wheel. With the proportion shown, the small wheel drops approximately

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*Reprinted from Engineering, London, with verbal changes.

2.1 times as much as the large one. If the speed of the vehicle is constant the shock when the wheel strikes the other side of the hole will therefore be about 4.4 times as great. As a matter of fact, the speed at which the wheels of a vehicle move over a rough road is not constant, for they tend to accelerate if the movement is downward, and decelerate when going up. The accelerating force depends on the angle *A B C*, and therefore increases in a greater ratio than the inverse of the wheel diameter.

MAGNITUDE OF VIBRATIONS

It will be seen that in all cases the amount of vibration must increase in a considerably greater ratio than the inverse of the square of the diameter of the wheel, and in practice it must often increase nearly, if not quite, as the cube. This means that a very small increase in diameter of the wheels will very much reduce the vibration, and this is certainly in accordance with practical experience. Those who have actually experimented with different sized wheels have found that a difference of even 2 inches makes a very perceptible difference in the vibration. An instance of this occurs in the bicycle. When the safety, in its present form, first became universal, several makers tried very hard to introduce 26-inch wheels in place of the usual 28-inch, but in spite of the fact that machines with such wheels could be made lighter and more compact, the extra vibration was found to be so considerable as to completely outweigh the advantage gained. Similarly, there is a very distinct advantage in the case of an ordinary motor-car in substituting 34-inch wheels for 32-inch.

The matter is of the greatest importance in the case of commercial vehicles, such as trucks and omnibuses. It is well known that the great difficulty in making these pay arises from the need of very heavy repairs due to the vibration on the road. Now the ordinary motor-truck has wheels only about 3 feet in diameter, although the load carried per axle is sometimes as great as that on a fair-sized traction engine, and the speed often greater, In many cases rubber tires are an absolute necessity in order to prevent constant breakdown from this cause. In some cases where rubber tires have been fitted to trucks, which previously had iron ones, the saving in expense of repairs has been enormous, being sufficient to cover the cost of the tires and still leave a surplus.

Rubber tires are, however, a very expensive remedy for a defect which really should not exist. The mere fact that a vehicle is self-propelled does not increase the vibration, and as it is a matter of common knowledge that horse-drawn vehicles can be run without rubber tires, it should be equally possible for motors to do so. In some cases, no doubt, the failure to run on iron tires has been due to their being made by motor-car makers who had no experience in the manufacture of machinery to stand either hard work or vibration, but this is not invariably the case.

HEAVY WEIGHTS ON METAL RIMS

That heavy weights can be carried on self-propelled vehicles at good speeds without rubber tires is shown by the success of the traction engine and light tractor. The showman's traction engine weighs considerably more than any motor truck, even when the latter is loaded, and is frequently driven at speeds of 9 to 10 miles an hour, and for distances of anything up to 90 miles in the day, yet it is not found necessary to fit it with rubber tires. Similarly, the small traction engines built to come under the Motor-Car Act do not need rubber tires. These are, it is true, driven by steam, and it is sometimes contended that the fact of a truck being driven by an internal-combustion engine makes rubber tires necessary. There is, however, no reason why vibration should be more harmful to an internal-combustion engine than to a steam-engine, if both are equally well constructed; and it has been well proved that steam-trucks with small wheels are very expensive in repairs if driven fast. Further, in the trials of War Office tractors a tractor driven by an oil-engine, and fitted with iron wheels 5 feet 8 inches in diameter, was driven at speeds up to about 11 miles an hour, and it was shown that at this speed there was no serious vibration. Even in the case of the smaller vehicles, in which the speeds are such that rubber tires are a necessity, there is the same gain in increasing the wheel's diameter as in the case of iron tires—that is to say, that although it may be possible to run with small wheels, if rubber tires are used, without the vibration and repairs becoming absolutely prohibitive, these could be very greatly decreased by the use of larger wheels. This is a matter of great importance in the case of motor-omnibuses, and in some cases trucks, as the enormous amount of repairs and the very heavy depreciation consequent on their short life are the two items which are mainly responsible for their want of commercial success.

Where pneumatic tires are used, as in the case of the pleasure car, there is no doubt that the wheels may be very much smaller than in the case of iron or solid rubber. Even here, however, there is no doubt that larger wheels than are often fitted would be a great improvement in reducing the vibration from the road, and therefore increasing the comfort of the passengers.

DAMAGE TO ROAD SURFACE

The question of damage to the road surface is a more serious one to the public, who have to pay for the road, than it is to the motorist, except in the case of motors for use in the Colonies, where roads are in many cases so bad that the motor may damage the surface to such an extent as to be unable to proceed. As we have seen, either the wheel or road must become deformed in order that a sufficiently large area of contact should be produced as will carry the weight. Where iron tires are used the greater part of the deformation takes place in the road, especially in the case of soft roads, such as some of the colonial tracks. Let us take the case of a vehicle traveling along such a road with large wheels, as in Fig. 3, and compare the results with those of a vehicle of the same weight, but with wheels half the diameter, as in Fig. 4. Assuming that the road will carry the same load per square foot in each case, the smaller wheel will sink in more than twice as much as the larger. The resistance will, therefore, be more than twice as great. In addition to this the small wheel may very easily sink in to such an extent that the slope in front of it is too steep for the wheel to climb up, in which case the wheel will simply revolve without the car making any progress. In the case of soft roads or tracks the use of rubber tires will do nothing whatever to help this—in fact, they may have an adverse effect, as it is impracticable to make rubber tires of the same width as iron wheels.

This question of the size of wheels is of the very greatest importance in connection with the question of mechanical transport in colonies where the roads are usually of dirt. The two classes of vehicles now available are the traction engine and the motor truck. The traction engine has large wheels, but is very heavy, while the truck, though lighter, has very small wheels. At present the traction engine can undoubtedly be used on roads too bad for trucks, and, in fact, agricultural engines even in England habitually go where the truck could not. There is no doubt whatever that the lighter a vehicle is the softer the road it can safely traverse, if equally well constructed in other ways, and therefore a motor truck, or light tractor, with an oil-engine could be constructed to go over much softer roads than a traction engine, if provided with proper sized wheels. In this connection it must be remembered that as the strength of a chain is its weakest link, so the ruling strength of a road is the weakest part; and that even if the greater part of a road is good, a vehicle running over it must be able to get through the softest parts without sticking.

Where roads are all built with such a hard surface that the wheels do not sink in perceptibly the amount of deformation does not very materially affect the user of the car. The fact that the weight is concentrated on a smaller surface must, however, increase the damage to the road. In any scheme for the taxation of vehicles in order to pay for the repairs of the roads direct, instead of their being repaired solely from the rates, there should therefore be some differentiation between vehicles which have large wheels and those which have small.

Where the tire is of solid rubber or pneumatic the tire deforms a great deal more than the road; but here, as in the case of the soft road, the deformation depends on the size of the wheel. Thus in the case of two wheels, one-half the diameter of the other, the tire of the smaller will have to deform about twice as much to get the necessary surface to carry the load, the position being the inverse of Figs. 3 and 4. In addition to this it is deformed twice as often, as the small wheel has to make twice as many revolutions per minute for a given speed. This means in a solid-rubber tire that the internal friction is very greatly increased.

USE OF THE PNEUMATIC TIRE

In a pneumatic tire the greater deformation of the tire is avoided simply by blowing it up to a greater pressure, but this involves greater strain on the fabric. In this case, however, the small wheel has the disadvantage that the various strains which come on the tire have to be transmitted to the rim through a very much smaller part of the cover. Figs. 5 and 6 show the pneumatic tires of two wheels one twice the size of the other, the tires being blown out to such a measure that the rim is kept the same distance from the ground in each case. In each case the part of the fabric which transmits the driving and side strains on the tire to the rim is shaded, and it will be seen that in the one case it is about one and a half times as great as the other, and the strain on each part of the fabric only two-thirds. In addition to this, as the wheel only makes half the number of revolutions a minute at a given speed, the strain is only produced half as often. That there is a very material difference in the amount of tire troubles even with very small differences in size is shown by the results of the tire troubles in reliability trials given herewith, from which it will be seen that there is a steady decrease in the amount of trouble with tires as the size of the wheel is increased, although the larger wheels usually have a larger weight to carry.

The whole question of the size of wheels, like many other matters in connection with motor vehicles, requires looking at from a very different point of view to what it did some years ago. Then, in the case of pleasure-cars, at all events, speed was the main consideration, and running expenses were hardly considered, as cars were not used by the general public, but only by a few enthusiasts. The construction of cars was therefore governed by racing characteristics, the whole object of the design being to sacrifice durability to lightness. In some quarters there is a tendency to shirk the whole matter by saying that if the motor vehicles do not suit the present roads, the latter should be improved till they suit the machines. This is an entirely wrong point of view. In the first place, if machines cannot be run except on a road as smooth as a railway, it will be better to build the latter straight away instead of the road. The whole object of motor traction is to avoid the expense of making a railway, and in this case the vehicles must be made to run on roads as they are, and not on some theoretical road which is impracticable. In any case it is quite unreasonable to raise a cry for better roads until the vehicles have been made to suit the present roads as far as practicable. To make all the roads perfect would be an extremely expensive matter, while to design and build the motor vehicles with larger wheels is by no means so, and the difficulty is confined to a certain amount of trouble to the designer.

AVERAGE LOSS OF TIME IN MINUTES FOR CARS WITH DIFFERENT SIZED WHEELS

	Size of wheels.				
	30 in.	32 in.	34 in.	35 in.	36 in.
Scottish trial, 1908	13.6	4.5	3	..	3.3
2,000 miles trial, 1908	25.2	17.7	13.3	4	6
Scottish trial, 1909	32.4	10.8	9.7	..	0

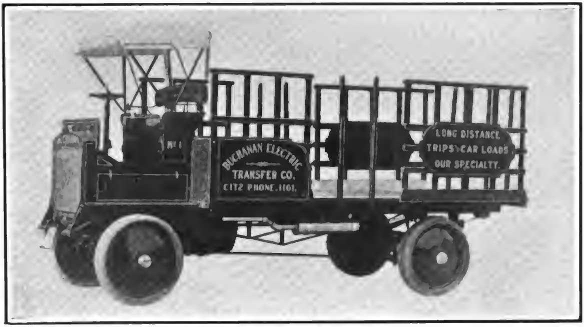
The Norfolk & Southern Railway has given a contract for the first gasoline motor car to be placed in regular railroad service east of the Mississippi River. The car is to be built by the McKeen shops in Omaha and is to be used in passenger service between Norfolk and Edenton, N. C., via Suffolk, Va. It will seat 70 passengers.

At the request of the first assistant postmaster general a test of the automobile as a collector of mail was recently made in Kansas City, the car used being a 28-horsepower Franklin. Two collection routes, along which were widely scattered 150 letter boxes, were selected for the trial. With the ordinary methods of collection the covering of this combined route takes seven hours and twenty minutes for two men and two horses. With the motor vehicle a start was made at the city hall at 5 o'clock and at 7.40, after the lapse of two hours and forty minutes, the collector had returned to the post-office for the last time. The distance covered was approximately 35 miles and a stop was made at each of the 150 boxes. This saving of four hours and twenty-five minutes in the collection of mail on the two routes was made in a test conducted by H. J. McKinnon, city superintendent of carriers.

COUPLE-GEAR GAS-ELECTRIC FOUR-WHEEL DRIVE TRUCK

PROFITING by its experience gained in the construction of three combination gas-electric trucks to special order, incorporating the four-wheel electric-drive principle employed in all of its electric vehicles, the Coupler-Gear Freight Wheel Company, of Grand Rapids, Mich., has developed a standard gas-electric truck in two sizes, with capacities of 3½ and 5 tons. The smaller model is shown in the accompanying engraving.

In these machines the advantages of electric transmission (with its absence of clutch and change-speed gearing) and of four-wheel drive and four-wheel steering, are combined with the lighter weight of the gas engine as compared with the storage battery as a source of energy and the advantage of an unlimited radius of action and mileage. Having a self-contained generator, these trucks are not dependent upon electric-charging facilities, but can be used in remote mining regions and for long-distance hauls wherever road conditions permit. The range of speed is from zero to maximum, with a perfect graduation. The cars can be run at any desired speed continuously and efficiently, and the engine can be run at the rate best adapted to the work it is performing without regard to the speed of the vehicle. The gas-electric trucks weigh a little less than the company's storage battery trucks, and no more, it is claimed, than the best makes of gasoline trucks of the same capacity.



COUPLE-GEAR FOUR-WHEEL DRIVE, FOUR-WHEEL STEER, GAS-ELECTRIC STAKE TRUCK

The appearance of cumbersomeness and awkward size of the power plant that is usually associated in the mind with the gas-electric combination is not evident in this new Couple-Gear product. As the illustration shows, the engine and generator are compactly disposed under the floor and footboards below the driver's seat, leaving ample body room for the load without excessive overall length of car, which measures 18½ feet from end to end. The wheel base is just 12 feet; tread, 5 feet 6 inches. Load length of body is 14 feet.

Speed ranges from zero up to 12 miles an hour with load and to 16 miles an hour empty.

A four-cylinder vertical engine is used, with 5 by 5½-inch cylinders. With flywheel, it weighs 600 pounds. The crankshaft drives an electric generator especially designed for the work and built in the company's own factory. It is rated at 12½ kilowatts at 100 volts, 680 revolutions per minute. It will run without sparking at an ampere load 300 per cent in excess of its normal rating and with a 100 per cent. rise in speed. At maximum speed the voltage can be held down as low as 40. The generator is a 6-pole machine, with the same number of commutating poles, compound wound with a dropping characteristic. When the amperes exceed 70 the voltage begins to drop, which automatically enables the engine to hold an increase speed at approximately the same rate as the increase in power that is demanded to propel the vehicle.

Engine and generator are mounted on a subframe suspended at three points on the channel steel main frame, thus relieving the power plant from any twisting strains.

Driving motors are enclosed within the four disc-type steel wheels, which protect them and the driving pinions and gear from dirt and water. The motors are rated at 33 amperes at 80 volts, with an overload capacity of 200 per cent. The gear reduction to the wheels is 25 to 1, and the driving effort is applied close to the rim.

Control is by a foot-operated pedal and a controller of street car type operated by hand. Ignition is fixed and requires no attention. A reverse lever on the controller gives the same range of speed backward as forward. A backward movement of the controller handle operates an electric brake. In addition, there are two pairs of mechanical brakes actuated by foot levers. The four-wheel steering mechanism combined with the fine speed gradations of the system gives remarkable driving control.

FINANCIAL STATEMENT OF GENERAL MOTORS CO.

REGARDING the nature of the General Motors Co., which has never been clearly understood in the automobile trade, Vice-President Durant gave some general information to a representative of *The Wall Street Journal* defining its position. Briefly stated, the General Motors Co. is a holding company and was incorporated about a year ago. It controls through stock ownership seventeen companies, including manufacturers of cars and manufacturers of parts, and its purpose is to enlarge its scope and the operations of the individual constituent companies by co-ordinating them in a plan for mutual co-operation and selling the cars of the manufacturers through an efficient sales system.

Originally the authorized capitalization of the company was $12,500,000, of which $7,000,000 was 7 per cent. preferred stock and $5,500,000 common. This was bought up by a few individuals, but with the recent increase in capitalization the company has lengthened materially its list of stockholders. Last month the capitalization was increased at one stroke to $60,000,000, of which $20,000,000 is 7 per cent. preferred and $40,000,000 is common.

Although only a small proportion of this new stock has been issued, the authorized increase bears some relation to the increase in the company's operations. Originally five operating companies were controlled by the company, while now there are thirteen controlled outright, four more with whom contracts have been arranged, and others for whose acquisition plans are already made. Those controlled, including several of the largest producers, follow: Buick Motor Co., the Cadillac Motor Car Co., Olds Motor Works, Oakland Motor Car Co., Marquette Motor Co., Reliance Motor Truck Co., Rapid Motor Vehicle Co., Weston Mott Co., Northway Motor & Manufacturing Co., Bedford Motors, Ltd., of London, McLaughlin Motor Car Co., Welch Co., and Elmore Co.

In the report about to be issued to the stockholders is given the balance sheet as of September 30:

ASSETS

Cash assets		$1,365,235
Stocks owned (valuations based on inventories of September 30)		16,288,049
Other investments		690,572
Other assets		37,512
Total		$18,381,368

LIABILITIES

Companies and individuals		$11,593
Dividend (due Oct. 1, 1909)		237,174
Capital stock—		
Preferred	$6,782,494	
Common	4,211,630	
		10,994,124
Surplus		7,138,477
Total		$18,381,368

The surplus of $7,138,477 remained after $1,040,000 had been deducted for depreciation at the various plants, patents and questionable assets.

The operations of the company during 1909 exceeded the expectations of the directors. It was announced at the beginning of the year that 22,000 cars would be produced by the controlled companies and that the amount of business done would approximate $25,000,000; in fact, 28,500 cars were turned out and the volume of business done was $34,000,000. It was also given out a short time ago that 40,000 cars would be manufactured in 1910 with a total valuation of $45,000,000, but already orders from agents have been received for 68,000 machines whose value will approximate $60,000,000.

At a meeting of the directors following the increase in stock, a stock dividend of 150 per cent. was declared on the common stock; this dividend is payable November 5 to stock of record November 4. Dividends on the preferred stock have been paid semi-annually at the rate of 7 per cent. a year, or $474,775. But no cash dividend has yet been paid on the common stock. The earnings have been sufficient to pay the preferred dividends several times over, and the surplus remaining, it is understood, amounts to considerably over 50 per cent. on the common stock. On the other hand, it is a matter of policy, as the nature of the company's operations is obviously such that all available funds can be profitably used in extending the business.

At a recent meeting the following were elected directors of the company: Wm. C. Durant, Curtis R. Hatheway, W. J. Mead, W. A. Eaton, H. G. Hamilton, John T. Smith and Henry Henderson. The officers elected at the same time are: President, W. A. Eaton; vice-president, W. J. Mead; secretary and treasurer, Curtis R. Hatheway. W. C. Durant is chairman of the executive committee.

There are some truck builders in this country who have devoted a great many years to this subject, and who, to-day, are placing on the market trucks well worthy of a business man's investment, but, on the other hand, the moment success crowns their efforts, there are a lot of concerns who jump into the business, thinking all they have to do is to start where the other fellow left off, and the result is they are soon in a lot of trouble and their customers as well. Many a mechanic from the very beginning will tell you it is no trick at all to build a motor truck, and I believe there are a lot of wagon builders before me who think that it is not any great task to produce one. I thoroughly agree that any ordinary mechanic can buy a motor, a clutch and a transmission from some mail order house, and, with a lot of blacksmith work, he will eventually get something together that is propelled by its own power, and he has produced what he calls a motor truck, and it actually will haul goods, but, gentlemen, that is the first step in pioneer work. A motor truck that has ample carrying capacity, that will stand up under the service for which it is intended every day in the week and every week in the year, no matter what the weather conditions may be, and do it without getting out of fix or needing unnecessary repairs, is another point.—B. A. Gramm, in an address before the Carriage Builders' National Association.

THE USE OF "WHITNEY" CHAINS ON MOST OF THE COMMERCIAL MOTOR VEHICLES IS SOMEWHAT OF PROOF AS TO "WHITNEY" CHAIN SUPERIORITY

Whitney Chains are Connecting Links to Success for Every Builder, Owner and Driver of a Commercial Vehicle

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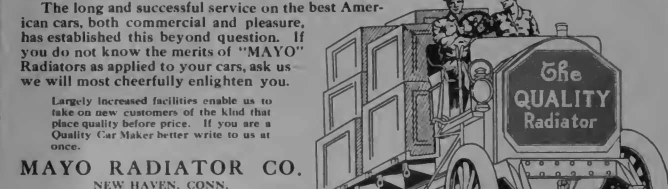

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